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International edition

The independent Dragon magazine

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How to submit articles

The quality of the material we can publish in *Dragon User* each month will to a very great extend depend on the quality of the discoveries that you can make with your Dragon. The Dragon 32 computer was launched on to the market with a powerful version of Basic, but with very poor documentation.

Every one of us who uses a Dragon will be able to discover new tricks and quirks almost every day. To help other Dragon users keep up with the speed of the development each of us must assume that we made the discovery first — that means writing it down and passing it on to others.

Articles which are submitted to *Dragon User* for publication should not be more than 3000 words long. All submissions should be typed. Please leave wide margins and a double space between each line. Programs should whenever possible be computer printed on plain white paper and be accompanied by a tape of the program.

We cannot guarantee to return every submitted article or program so please keep a copy. If you want to have your program returned you must include a stamped addressed envelope.

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£250 of software from Microdeal is this month's prize to Gordon Lee's number puzzle

Editorial

TWO YEARS AGO Dragon Data appeared to be one of the most successful young British micro companies around. Backed by Mettoy, Dragon appeared from nowhere to produce a machine with 32K RAM, colour graphics, 16K ROM and a 6809 microprocessor. More importantly it was available at a time when there were lengthy delays for Acorn, Sinclair and Commodore machines.

Dragon quickly established a sizeable user base and was stocked by giant retail chains such as Boots and Dixons. Independent software and book publishers soon provided a plethora of additional products. So what went wrong?

Dragon's main product — the 32 — though regarded as slightly old fashioned now was extremely competitive at the time it was launched. But follow up machines such as the 64 and the Professional were a long time in coming. Nevertheless Commodore's 64 is still selling extremely well and it was launched at around the same time as the Dragon.

Part of Dragon's difficulties undoubtedly stem from the cyclical nature of the micro business. As much as three quarters of a company's annual sales may be generated in the three month Christmas period. Dragon, faced with booming demand, geared up production to meet anticipated sales. Consequently when those sales failed to materialise Dragon found itself with a massive cash-flow problem.

Injections of cash from GEC and others kept the company afloat, but the impetus was lost. Sadly, that impetus was never regained.

Dragon has not, however, disappeared completely. Though it now appears unlikely that Tandy will take over Dragon, a mysterious Spanish company has stepped in. Eurohard SA is now favourite to take over manufacture of the Dragon 32 and 64 machines. A new company, Touchmaster, is also being set up by ex Dragon directors Brian Moore and Richard Wadman to provide Eurohard with sales and software support in the UK.

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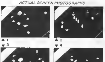

1 *Under attack from enemy fighters*
2 *Missile attack on fuel installations.*
3. *Low level attack on village*
4. *Yet another wave of enemy fighters!*

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The reference to ZAXXON (which is a registered trade mark of SEGA ENTERPRISES [illegible] suggest any [illegible] between Cable Software Limited and Sega Enterprises Inc.

Letters

This is the chance to air your views — send your tips, compliments and complaints to Letters Page, *Dragon User*, 12-13 Little Newport Street, London WC2R 3LD.

Light-pen listing

THE LISTING below produces a graph when used in conjunction with the light pen project (*Dragon User* April 1984)

```
10 CLS  PMODE 4 1  PCLS
SCREEN 1 1
20 LINE—(0,180) PRESET
30 FOR X=1 TO 255
40 A=(JOYSTK(0)*4) Y=180-A
50 IF Y<1 THEN Y=1
60 IF Y>180 THEN Y=180
70 LINE—(X Y) PSET NEXT
80 PCLS GOTO 20
```

T Peakson
Daventry
Northants

String saving

ONE unwanted facet of the Dragon s string handling and saving routines can cause problems, especially with datafile programs based on string arrays allowing a maximum of 255 characters per array element

While the Dragon will allow 255 characters to be entered into a string if this is recorded and subsequently reloaded into the program only 249 characters are input This can cause unexpected and very difficult-to trace FC crashes especially if the program is expecting a special control character as the final character The solution is to change lines in the program which specify a maximum of 255 characters to 249 Thereafter there should be no problems in saving and loading data from these programs

Robin Hamilton
Loughborough
Leicester

Troublesome Trainer tip

MIKE Harrison s most useful review of Dragon Books (June 1984 *Dragon User*) mentions a tip given in *Dragon Trainer* for increasing the available memory to 30K by POKEing 6 into locations 25 27 29 and 31 My tip is *don t* On my machine at least it does indeed increase the available memory but results in UL error messages when the program is run

Cathy Hyde s method, in September 1983 Dragon Answers is to use POKE25 6 POKE&H600 0 NEW and this works perfectly In fact, I found that POKE&H600 0 is unnecessary, as address $600 (or 1536) contains the value 0 to start with The only snag with this method is that the command NEW cannot be part of a program and POKE25 6 NEW must be entered as a direct command before the program is loaded

Perhaps one of your readers has solved the problem of embedding a command in a program to make use of the Dragon s full memory by liberating the 6K normally reserved for graphics without any attendant snags

R Hadekel
London

No joy with joysticks

IN THF June edition of *Dragon User* Brian Cadge replied to a reader that the Dragon uses potentiometer-type joysticks While this is perfectly correct I have found it impossible to use joysticks with potentiometers fitted with my Dragon

My problems started when I read an article in *Dragon User* where the circuit diagram of the Dragon joysticks was shown, using 100K potentiometers

Being an electronics engineer I bought a professional type 100K potentiometer joystick and wired it to the circuit diagram Here problems arose The Dragon s A/D converter will return a value between 0 and 63 corresponding to the position of the potentiometer track

The potentiometers track is 270 degrees but when fitted to a joystick the wiper can only move 25 degrees so instead of getting a change of 63 you find you get a change of only seven This causes problems because most commercially available programs use 0 and 63 to move the screen character

My answer to the problem was to modify a switch type joystick With the joystick in the centre position the A/D converter returns about 32 degrees as soon as the joystick is moved one switch closes and the wiper ' is taken to one extreme (0 corresponding to 0 or 100K corresponding to 63)

My modified joystick has been working for several months now with no problems

Graham Marshall
Grays
Essex

Scrolling disaster

I EXPECT someone has already pointed out the total disaster that would result from using the object code of the Screen Scroll by Mr Philips in your April Letters column Most of the operands and postbytes are missing so entering it in hex with a monitor or the Basic as listed would not scroll the screen The first instruction loads X from &H9635 somewhere in ROM and from there on who knows?

The assembly source code looks a little more sensible but the PULS CC — PSHS CC loop is liable to corrupt the return address Another mystery is the use of CMPA #0 the instruction TSTA does this in *one* byte but the preceding DECA sets the flags anyway so it is redundant, and with a screen scroll you need all the speed you can get So much for details to get it working but I still don t see why you need the inner loop with a count from &HB9 Hi-res graphics addresses are continuous so there will be wrap round anyway with the program as written so the extra test to detect the end of a line width just wastes time

I suppose after all that I d better give a version for someone else to pull apart!

```
9E BA  LDX  &BA  Set X to
   Graphics Base addr
32 7F LEAS  −1 S Dec Stack
   pointer to miss stack
35 01 LOOP PULS CC Get carry
   from last loop
69 80 ROL  X+ Rotate bumping
   X to next byte
34 01 PSHS CC Save carry
9C B7  CMPX &B7 Compare X
   with Graphics Top addr
26 F6 BNE LOOP Loop if not
   done
32 61 LEAS 1 S Restore S to
   point to Return Addr
39 RTS Return to Basic
```

This is for Resolution graphics and scrolling Left For Colour you need to rotate by two bits so the whole operation has to be done twice It cannot be done by inserting an extra rotate instruction without a way of carrying two bits to the next loop To scroll Right use

66 82 ROR —X and work down loading X from &B7 (Gr Top) and comparing from &BA (Gr Base)

You can avoid using the stack to store the carry by using TFR CC A and back but Mr Philips method is in this case faster

Stuart Sampson
West Yorkshire

Dictated message

WITH regard to entering machine code listings such as Grand Prix by Brian Cadge in your June issue The easiest and most trouble-free method I have found is to dictate the code on to cassette thus leaving full concentration for avoiding typing errors during playback Unfortunately the added complexity of symbols in Basic program listings makes this oral method a time saver only for entering machine code

W H Jones
Fishguard

IF ANY readers are having trouble loading Brian Cadge's Grand Prix game send an SAE to *Dragon User* and we will provide you with a typed sheet of loading hints written by Brian

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Chart compiled by Websters Software

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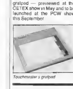
Ole!

MANUFACTURE of the Dragon 32 and 64 looks certain to move to Spain as negotiations move into the final stages at Dragon Data

At the time of going to press Spanish firm Eurohard set up with the help of the Spanish government specifically to manufacture computers in the Extre Madure region (a development area 180 miles south west of Madrid close to the Portuguese border) exchanged contracts with Dragon Data to manufacture the Dragon machines The firm prior to the receiver being called in, was negotiating with Dragon to obtain a licence to manufacture the machines in Spain

GEC is planning to market the Dragon in the UK and after-sales support will be provided by Touchmaster — a new company made up of ex-Dragon Data employees headed by ex-managing director Brian Moore and former marketing director Richard Wadman

Touchmaster s first project will be the manufacture of a grafpad — previewed at the CETEX show in May and to be launched at the PCW show this September


Touchmaster s grafpad

Prutech — the high technology investment arm of the Prudential Insurance group is thought to be the main backer of Touchmaster The company also had a 49 per cent stake in Dragon Data

Tandy withdrew from negotiations after its final bid was rejected by the receiver The company had hoped to acquire the Dragon name and finished goods stock in order to provide support to users

The formation of Touchmaster and the continuing manufacture of the Dragon is good news for users worried about flagging support for their micros Dragon Data s existing stock of software utilities and peripherals will be sold by Touchmaster Brian Moore commented that there should be some good bargains available once plans have been finalised It is not known how many Dragons are left in stocks nor what will happen to them

The future of the Dragon Professional and project beta is uncertain It is also not known whether Touchmaster or Eurohard will take over Dragon Data s existing liabilities

No joy for Users club

THE FATE of the Dragon Users club hangs in the balance as negotiations get under way between John Richardson formerly of Games and Computers and David Tomlinson of Cotswold Computers who has expressed an interest in taking over the club

Several readers have written and phoned *Dragon User* complaining that the club has cashed cheques and failed to deliver the goods Computerhouse which supposedly took over the running of the club (see *Dragon User* April) admits that there are a number of outstanding orders and liabilities but says it didn t take over the club and is therefore not responsible for existing liabilities

The story is a complicated one Alan Monaghan of Computerhouse said that a company was set up with the intention of running the Dragon Users club however this was never actually done " We found it impractical to take over the Users club and suggested to John Richardson that he make other deals "

Computerhouse then became Computerhouse UK Limited and at present distributes the Pied Piper micro John Richardson is a director of Computerhouse UK Ltd He was unavailable for comment though John Bobitol of Computerhouse suggested that all inquiries about outstanding orders should be directed to John at his home address 68 Gorse Lane Upton Poole Dorset

Computerhouse has received a number of callers but maintains that it cannot help anybody as the club is the responsibility of John Richardson and not Computerhouse John merely happens to work for Computerhouse I d like to see it all settled said Alan Monaghen so presumably would Users who have to date seen nothing for their money

Club founder John Richardson

Alan assured us that " something is being done " and that part of the deal that John Richardson organises will be that people will get what they ordered However David Tomlinson of Cotswold said that any agreement he makes with John Richardson will not involve Cotswold taking over the outstanding liabilities and he stressed that people should not contact Cotswold about these The liabilities are nothing to do with us he said

Cotswold is interested in taking over the list of club members thought to number about 1.800 and to continue to offer discounts to members — possibly in the region of 10 per cent

Facilities to produce a magazine exist at Cotswold Computers though David hopes that someone else will be interested in compiling the editorial contents of the magazine should Cotswold begin running the club Anyone who is interested is asked to contact David at 6 Middle Row Chipping Norton Oxfordshire David added that it would be impossible to undertake the administration of the cassette based magazine *Dragon wings*

At present negotiations are still under way to find a solution to the problem and it is suggested that readers do not send any money to the Club until existing orders are honoured

---

BROTHER has launched a new range of printers for the home computer market Of interest to Dragon Users is the M1009 impact dot matrix printer which is expected to retail for under £200 The M1009 uses a 9 pin print head has the full 96 ASCII character set a graphics set and international characters The standard interface on the printer is the Centronics parallel though it is expected that Brother will also manufacture a dual interface (RS232 and Centronics) in the near future

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'I'm go ng to be a software pirate when I grow up!'

MSX - what now?

GEC Dragon was to launch a MSX machine — what's all the fuss about, by ***Gordon Ross***

THE NEWS that Dragon Data in conjunction with GEC was to launch a Dragon MSX machine prompts the question What exactly is MSX about? The short answer is that MSX is about compatability MSX is an operating system that allows software and peripherals for one micro to work on others using the MSX standard

Comparisons can be made with the video trade — any VHS video recorder can be used to play VHS video tapes Similarly with betamax a betamax tape will play on any of the many different brands of betamax recorders Philips tried launching its own video recorder standard — the Philips 2000 around the same time as the VHS and betamax systems were launched The project failed Hence the importance of compatability

As Dragon owners know (often to their disappointment) Commodore Spectrum and other software will not run on the Dragon even the Tandy with all its similarities to the Dragon is not software compatible The result is that hardware specific software has had to be programmed for each individual micro With the arrival of MSX all this will change

September launch

The Japanese are the force behind MSX Eight Japanese manufacturers — Canon, Hitachi JVC Mitsubishi Sanyo Sony Teleton and Toshiba have combined to form a British MSX working group to coordinate the launch of MSX in Britain and to liaise with software companies in the UK to produce products for MSX The expected official launch of MSX in Britain is this September and several British software companies are believed to be releasing software in September/October including a number of companies that produce software for the Dragon such as Premier Micro Systems Hewson Consultants Computer Rentals Mastertronics and Sulis Software

The MSX standard has been devised by the American firm Microsoft and a total of 19 manufacturers are said to have acquired a license to produce the machine The license is not cheap It is a rich man's club not a poor man's said Philip Sutcliffe Overseas Export Manager of Microsoft (UK & Scandinavia) who refused to specify the exact cost though it is thought to be in the region of 250 000 US dollars

GEC was approached by the British MSX working party in May at the CETEX show in Earls Court London with a view to joining the group The license that GEC has acquired from Microsoft to manufacture the micro is rumoured to be the sole rights to produce MSX in Britain (The Japanese firms will be importing their versions into Britain) The company has not yet joined the working party which is open to all manufacturers of MSX should they wish to join

Microsoft has set the specifications for MSX hardware and software though within its guidelines individual manufacturers are at liberty to produce a design of their choosing — provided compatibility is maintained Thus a Sony disk drive for example will work on a Hitachi micro as will a

Sanyo Light pen and a Yamaha synthesiser

The broad specifications laid down by Microsoft provide that each of the machines will use a Z80 processor with a 32K ROM including Microsoft Basic and at least 8K RAM The same TI video chip giving a 40 × 24 text display (256 × 192 graphics resolution) with 16 colours available is used together with the same GI three-channel sound chip on all versions Where a disk unit is available as an option, 3½ inch disk drives will run Microsoft's MSX disk operating system MSX-DOS which is data compatible with MS DOS meaning that IBM files can be exported to an MSX machine

GEC's MSX machine is thought to have 64K RAM a Z80 processor and a built in 3½ inch disk drive unit It is not known where the manufacture of the new machine will take place nor if Touchmaster the UK firm set up by ex-GEC Dragon chiefs Brian Moore and Richard Wadman will have any part in the operation

The Microsoft standard is a controversial one Several software companies are disappointed that the manufacturers have chosen the somewhat elderly Z80 processor The relatively old technology however must be compared with the overall concept of MSX Distributors small computer dealers and the High Street retail stores are extremely enthusiastic The demand from them is to stock MSX solving their merchandising problems With interchangeability stores need not worry about compatability Further software companies can cut development costs by producing only one version of a game and mass marketing it on the various MSX machines This could lead to a reduction in software prices

Brian Moore former managing director of GEC Dragon spoke at a major conference as far back as April about the dangers to UK manufacturers of MSX "MSX could well dominate major sectors of the home computer market and comparisons with VHS and video recorders can be readily drawn said Brian who estimated that 100 000 to 150 000 units will be available this year Continuing with his speech he said that predictions indicated that the Japanese will take 30 to 35 per cent of the home computer market "and that's for a product that hasn't even arrived in this country yet"

Established business computer companies are thought to have little to fear from MSX The machines are games orientated and unsuitable for serious use at present However through MSX DOS there is a way to compatability with the IBM PC and MSX may offer compatability with business machines in the future

The probable cost of MSX will be in the region of £250 £300 Derek Madden of Sanyo revealed that Sanyo's MSX machine with 64K user RAM 32K ROM and 16K video ROM will be retailing for £299 95 The machine with built in RS modulator to connect to a light pen will be launched this September A 12-month warranty comes with the machine which can be returned to Sanyo on a prepaid basis though the Post Office within a year A network of service centres around the country should be in existence after the expiry of the first 12 month warranty

Derek envisages the launch of several generations of MSX over the next seven or eight years "This year MSX products will be at entry level and by late 1985/early 1986 he foresaw the introduction of a new range of machines with a "superchip for micro/audio and video products "The whole idea of MSX is upgradability" said Derek saying that the Z80A chip will be totally compatible with any new developments

Former GEC Dragon director Brian Moore —forewarnings about MSX

The immediate vision for GEC may not be so bright Brian Moore commented that GEC was having trouble with components supplies and might wait until the beginning of next year before making its entry into the MSX market

Whether or not MSX will gain a toothold in this country remains to be seen The Japanese have chosen Britain as their overseas test market and with a reported advertising campaign of £1 million on the way the stage is set for an interesting battle in the home computer arena ■

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FACTS, FOLKS

During the last few years we have produced or licenced lots of software for the 6809 microprocessor. Most of the software has been advertised or reviewed at one time or another, but never all together — there was too much to say about each product. This month we are giving the "blurb" a rest and just printing a list of most of the software available from Compusense. If you want further details, write to us direct.

DRAGON/TANDY Software

	Cartridge	*Disk*	*Tape*
EDIT + (includes HI-RES)	34.50	24.00	n/a
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Vol 2 Game of life	5.99
Vol 3 Epson Scren Dump	5.99
Vol 4 Seikoshe Screen Dump	5.99
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Postage on above software — 50p per order

TANDY COLOR versions are available — but enquire first please!

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6809 Assembly Language — Leventhal	13.20 + 1.30 p&p
Programming the 6809 — Zaks	12.50 + 1.30 p&p
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Advanced Sound/graphics — Brain	5.95 + 0.50 p&p
*Dragon m/c — Jones/Cowsill	6.95 + 0.50 p&p

*These books contain DASM/DEMON examples

Monitor/Sound lead	4.31 incl p&p
Dragon Dust Cover	2.99 incl p&p
Dragon printer lead	14.95 incl p&p
DRAGON Disk drives	*Enquire for prices*

DASM/DEMON EDIT + are available from larger branches

FLEX/OS9 Disk Software

FLEX is available on a number of hardware systems including the DRAGON and TANDY COLOR COMPUTER. All the software shown here is fully compatible with these systems. More to follow soon!

Flex Operating System Ed/Asm for DRAGON	86.25
Flex Advanced Programmers guide	11.50
TSC DEBUG package	74.75
TSC XBASC precompiler	51.75
TSC Utilities	74.75
TSC PASCAL	230.00
Super Sleuth Dissasembler 68xx/6502 + source	97.75
Cross Assembly Macro Sets	51.75
6502 Simulator + source	97.95
6800 Translator + source	67.95
Strumecs structured programming macros	40.25
DYNACALC FLEX	172.50
COBOL Compiler	115.00
DYNAMITE 68xx dissasembler OS9	172.50
Intol C compiler linker	431.25
(also available for IBM PC and UNIX based mini/mainframes)	
Lucidata Pascal	103.50
Lucidata Xref	11.50
Lucidata Copycat CP/M copy routines	28.75
Stylomail/Spell (DRAGON only!)	172.50
DYNAFORM	57.45
DYNASPELL spelling checker	68.95
DYNASOFT PASCAL + runtime source	103.44
DYNASOFT C compiler	68.94
Windrush XMACE	55.20
Windrush C Compiler + link loader	189.75

Flex Operating System	40.25
TSC Editor + Assembler	51.75
TSC XBASIC interpreter	105.80
TSC Sort/merge package	74.75
TSC Text Processor	74.75
TSC Relocating Assembler/link loader	172.50
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6805 Simulator + source	97.75
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☆ ☆ ☆ Some of the software above is also available for OS9 — enquire! ☆ ☆ ☆
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No smoking on tubeway

John Scriven surveys the software scene

AT THIS time of the year many people go through a very strange personality change. Instead of getting up at the usual time and going to work in a normal fashion, they suddenly jet off to foreign parts, leap around in a most undignified manner, get stung by jelly fish, stand on sea urchins, eat food that gives them Delhi Belly or Montezuma's Revenge, and come back suffering from mild sunstroke — all in the name of "enjoying the holidays". It's hardly a good time for slaving away over a hot computer — in fact, the weather last summer was one reason given for Dragon Data's early problems. Software writers have obviously been working at top speed to put their products on the market before they too climb into their cars and zoom off for a week at Butlins or wherever it is they go.

Strident sounds

There is therefore a great number of programs out at this time of the year, although I would think it unlikely that many will be sold before September is through. There are some new names in this month's collection, which is encouraging, and some new ideas in the programs themselves, which makes my task more interesting. Something tells me, however, that I should invest in a set of ear plugs if the accompanying sound tracks become more strident.

The last thing **Mission XK1** from J Morrison Micros suffers from is a quiet opening. As the title pages roll the familiar strains of "Thus Spake Zarathustra" (recognisable to fans of 2001 AD and certain razor adverts) ring out in multi-part harmony. A mother ship appears at the top of the screen, and you steer your tiny craft from this down to a landing pad on the surface of the planet Zyphon. Progress is hampered by chunks of what was once the moon of Zyphon circling the planet, although it is possible to blast them out of the way with a laser cannon.

If you survive the landing, much needed fuel is drawn up from the planet and you have now to transfer it safely to the mother ship, once again avoiding the pieces of rock.

The game is well written, and appears quite spectacular the first few times it is played. I found that the music became irritating after this, and it wasn't possible to turn it off. (Lowering the volume on the TV naturally kills the more useful sound effects as well.) The game itself does not seem to progress anywhere, and although the asteroid belt becomes thicker as you play on, there are no continuing parts to play. I would agree that there are many other programs that are no more complicated and are very popular, but for me I'm afraid there was no magic. If, however, you want a thrilling rendition of space music, I'm sure Richard Strauss himself would approve of the sound track.

Beam Rider from Microdeal is yet another US import that originates from Spectral Associates. The screen is covered by more than a hundred little blocks arranged in rows. Steering a "beamer", you destroy the blocks by running over them. The speed at which you move is determined by whether there are any blocks in the direction in which you are moving. If there are, a beam shoots out and pulls you towards the block. Nothing could be that simple, however, and there are odd little problems like Spinners and Chasers that follow you around, just waiting till your attention slips.

If you manage to clear a screen before losing three men, another screen appears with the blocks arranged differently. The scoring system and rules for play are a little complicated, but soon acquired, and although the graphics are rather abstract, the game is fairly addictive. If you like Gridrunner, then this will certainly appeal to you, and is worth looking at.

A couple of months back I looked at the first of the Horace series of software to appear on the Dragon, Hungry Horace. This month I received the latest translation from a Spectrum original, **Horace Goes Skiing** from Melbourne House.

Kamikazi attack

In this program, the object is to steer Horace (with £40 in his pockets) across a busy road to a ski shop where he can hire his equipment, then back through the traffic to the other side before he can start out on the slope. The road is fairly quiet at the start, but soon reaches rush hour condition, and it's easy to end up on the wrong side of a juggernaut or one of the kamikazi motorcyclists that appears from out of nowhere. If this happens, you will have to pay out £10 for the ambulance, leaving you with less for ski hire.

Assuming that you manage to acquire your skis and return to the top of the screen, you can now help Horace to speed down the Hannekon slalom course. Trees are an obvious hazard to avoid if you value your skis, and there are the slalom poles to steer between if you want to gain points. The display scrolls up as Horace remains in the centre of the screen, and control is

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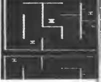
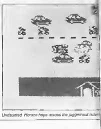


Avoid the nasties by switching mazes in Grabber



Undaunted Horace hops across the juggernaut laden

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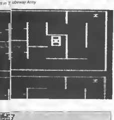
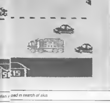




den road in search of skis

achieved by either joystick or keyboard.

If you complete the course there is another piste to follow — but of course it has to be on the opposite side of yet another busy road. As you reach higher levels, it's harder keeping a true course and there are even moguls — those mounds of snow caused by everyone following the same track on their parallel turns. Hit one of these awkwardly and the trees leap out to greet you!

Happy Horace

Horace games seem to translate well for the Dragon, and this is no exception. Presumably we shall soon see Horace versus the Spiders on our screens as well. Hungry Horace is a sort of up-market Pacman, and in some ways Horace Goes Skiing is reminiscent of Frogger although the graphics are much better. Not quite as much fun as Hungry Horace but better than average.

Beau Jolly, now marketing Imagine's existing stock, has an offering entitled **Cosmic Cruiser** which promises great things as it loads. A highly detailed graphic design of an astronaut appears as the main program enters the machine. The cassette insert is also dripping with information about the wonderful facilities that Imagine offer, sorry, used to offer their programmers, and goes into more detail about the writer than I've seen before, complete with life history and trendy photograph.

After this rapturous introduction, what of the product itself? The theme is fairly original — you are in charge of rescuing crewmen from a space station at the top of the screen and have to transport them to the safety of your cosmic cruiser. The graphics are quite detailed and the characters are reasonably life like. All the while the space station rotates at the top, occasionally revealing doors that can be shot open with a laser cannon from the base of the screen. As the spacemen appear, they can be collected and guided to safety.

. You can choose to use either the keyboard or joysticks to control the main spaceman or "hero" as he is called in the notes, and his movement is slow and ponderous, as if there really is low gravity. If you choose joysticks you will find that you have to use them upside down. If you use normal sticks there is no problem, but if you have the Spectravideo type, you will have a little difficulty.

My first impressions were of irritation, as the instructions are rather long winded, but once you grasp the general idea the game improves considerably and is quite lively when the aliens start to appear. I still don't feel it lives up to the impressions on the cassette insert, although the screen shots are a good idea. With clearer instructions the program would be worth a closer look.

As usual, Microdeal has produced even more titles this month. **Mr Dig** shows influences from several other games, combined in a new format. The screen shows a tunnel underground, viewed from the side. Buried in the earth are various unlikely objects, including cherries and apples. The cherries are what Mr Dig is after, and the apples can be pushed along to squash anything in their path. Just to annoy you, there are several Meanies who are out to spoil your fun. You can run from them, fire a Power Orb in their general direction, or use the ultimate deterrent — drop an apple on their heads.

There are a few other diversions, such as Letter Monsters who enable you to increase the number of your spare men, and the odd diamond that grows in the middle of the apples. This is clearly designed for quiet, non-aggressive children of less that 10, who will doubtless turn their noses up at it while their parents love it. At some times it resembles Pacman with you digging your own maze, and at others a sort of fruity version of Pengon. Not a game to get too ecstatic about, but well worth the standard £8.

A game that has given me a lot of pleasure this month is **Touchstone**, again from Microdeal. This is a graphic adventure for one or two players, and involves finding your way along a sideways scrolling maze collecting various treasures along the way. The adventure is presumably set in a pyramid as the documentation mentions Ankhs and the god Ra.

There are several unpleasant creatures that inhabit the maze, such as snakes, spiders and butterflies, but the fire button sends a chilling glance from your eyes (thanks to Ra) to destroy them. Some locations are friendlier than others, such as Zoom Chambers that take you across parts of the maze. Some have rather weird names, like the infamous Poof Chamber, however modesty prevents me from making any comments about this!

I enjoyed this game a lot, and would recommend it to anyone who likes adventures but finds text versions rather heavy going. You need arcade fingers as well as clear thinking to be successful. As you dash through the tunnels pursued by evil monsters, this program may make you feel like Indiana Jones, which makes me wonder when someone will produce a Dragon game based on *Raiders of the Lost Ark* or *The Temple of Doom*.

Doomladen

Another adventure that uses graphics, although not in the same way, is **Castle of Doom** from Paramount Software. This is basically a text adventure that uses graphics to show a 3-D view of the location, usually a corridor with doors on either side and occasional objects such as chairs, tables and windows. In this adventure, you are the "chosen one" who has the mission of finding the dreaded Count Doom and destroying him. There is less tongue-in-cheek amusement than in Richard Shepherd's Transylvanian Tower, and until you have the knack, the first stage is difficult to leave. The vampire's house consists of 27 locations, and the aim is to leave this and reach Doom Town. This has 36 locations, and is complicated by Castle Doom itself, with a further 27 rooms.

Instructions follow the usual Verb-Noun format of most adventure programs, such as "Take garlic" or "Open door", and ▶

◀ There is the useful addition of command voc which gives you a list of sound clues so it is important to use the command listen when you think something may be heard As usual inventory gives you a list of the things you are carrying at any particular time score tells you how you are doing and look redraws the location so you can see where you are

In some adventure games once you have solved the mystery there is little point in replaying the adventure In this game the objects that can assist you are scattered throughout the system of locations This gives it a certain edge over predictable adventure games although it is lacking in surprises and much humour If you are a serious adventure freak then you may like this program although I found it rather dry after other adventures

Damsel in distress

What s wrapped in clingfilm and swings from the bells of Paris? It pains me to tell you that the answer is The lunchpack of Notre Dame If you have the kindness to forgive me that apology for a joke and have had your eyes open in arcades recently you will have noticed that for some reason the exploits of a crippled Frenchman two centuries ago have proved fascinating to many people Charles Laughton starred in a cult movie many years ago and the story found its way to the arcades about a year back Hunchback is a popular game in which you take on the role of the unfortunate bell keeper as he swings his way far above the roof-tops of Paris attempting to rescue his doomed love Esmeralda

This game is brought to you by two firms this month Ocean Software with **Hunchback** and Cable Software with **Quasimodo** After spending several fruitless hours with each the conclusion I ve come to is that both are worthy of consideration as a reasonable version of a difficult arcade game They both have their good points as well as their more irritating features and I can t honestly say that one is better than the other

I found Hunchback closer to the arcade game and with rather more detail in the graphics but Quasimodo is easier to play in the early stages I would have thought a voice moaning The bells! The bells! would have provided a good soundtrack but Hunchback has musical touches — something like the Teddy Bears Picnic has to be borne bravely each time you play and a sort of soft squelching sound emanates from the TV speaker as the hunchback lurches across the screen

For what it s worth this title caused me more frustration as I failed to climb over the towers of Notre Dame for the umpteenth time but the frantic movements as I struggled to avoid the arrows in Quasimodo totally destroyed my favourite Spectravision joystick which wasn't up to the pounding involved in the game

The object in both programs is to overcome apparently insurmountable objects such as battlements and moats to reach Esmeralda and take her to safety On the way you may encounter such problems as floating islands flaming arrows and so on each involving its own special means of escape If you have extreme patience either of these games is likely to give you a lot of fun as well as a pile of broken joysticks

Horace Goes Skiing £5 95	Melbourne House Castle Yard House Castle Yard Richmond TW10 6TF
Mission XK1 £6 95	J Morrison Micros 2 Glensdale Street Leeds LS9 9JJ
Beam Rider **Mr Dig** **Touchstone** **Grabber** £8	Microdeal 41 Truro Rd St Austell Cornwall
Cosmic Cruiser £5 50	Beau Jolly 19a New Broadway Ealing London W5
Castle of Doom £6 50	Paramount 67 Bishopton Lane Stockton on-Tees Cleveland TS18 1PU
Hunchback £6 90	Ocean Software Ocean House 6 Central Street Manchester M2 5NS
Superbowl **Quasimodo** £6 95 (cassette) £9 95 (disk)	Cable Software PSL Marketing 52 Limbury Road Luton Beds LU3 2PL
Bug Diver £1 99	Mastertronic 46 George Street London W1
Mission Moonbase £6 99	Phoenix Software 116 Marsh Road Pinner Middlesex
Tubeway Army £7 50	Crystal Computing 125 Smedley Road Cheetham Hill Manchester M8 7RS
HiRes £3 95	Orion Software 64 Prince Street Rochdale Lancs

Go get em Floyd

A game from Microdeal that has some quite original touches is **Grabber**. This is a maze pursuit with a difference — there are two mazes on screen at all times and you appear as a figure on one maze Pressing the fire button on the joystick causes you to swop between them The object is to grab treasures shown on each maze and transport them to the centre while avoiding monsters who pursue you If they are uncomfortably close you can beam across to the other maze and continue the game there

Unlike Captain Kirk and Mr Spock who always avoided beaming down in the middle of a piece of furniture you can find yourself on top of a monster in the parallel maze which tends to prove rather lethal Although this is hardly more than a double version of Pacman complete with a type of power pill it has the makings of an addictive game — it is quite easy to begin but rapidly becomes a considerable challenge to remain alive on both screens

Mastertronic has made the headlines recently selling inexpensive software, (price £1 99 each) and **Bug Diver** is the first Dragon program from its 199 series In this game you dive from a little boat that speeds across the top of the screen At the bottom you have the task of collecting bugs and swimming with them to the boat which will gain you points Fish swimming from both sides with their mouths open try to gulp at you if you get within their range

Although the game is rather ordinary with a few mistakes on the packaging — for example enter LOAD rather than CLOAD — Mastertronic is to be commended in bringing prices down to pocket money rather than birthday present level

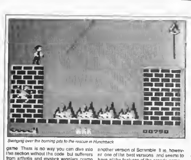
Cable Software who are responsible for some of the pile of shattered joysticks outside Notre Dame cathedral have crossed the Atlantic this month to bring us the first version of American football for the Dragon In **Superbowl** which is apparently endorsed by the newly formed Luton team the Flyers you control someone called Floyd seen from above as he hurtles up the screen The teams involved are the Washington Redskins and the Dallas Cowboys and the object is to steer Floyd round the opposing team as the screen scrolls downwards

Fancy footwork

It seems quite difficult to swerve past the padded figures as they hurt you to the ground once more and the play never seems to be reversed but maybe things change if you can ever get near the posts at the other end of the field This is not a game that had much appeal to me but with Channel Four coverage and sixty teams being formed into a league this is bound to find some ardent fans before long

Mission Moonbase is another twin cassette game from Phoenix Software and follows on from Death Mines of Sirus and The Emperor Must Die One cassette contains the action game where you have to control a maniac buggy across a rough surface while avoiding Siren raiders that buzz along above you These can be removed by a double firing laser but potholes must be leapt to stay in the game

Occasionally you receive progress reports on the screen and if you reach the base you will be given the code necessary for the second adventure part of the


Swinging over the burning pits to the rescue in Hunchback

game There is no way you can dive into this section without the code but sufferers from arthritis and joystick wigglers cramp may find benefit in the fact that Phoenix supply an emergency phone number where you can obtain the code in times of desperation

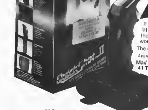
Gary Numan s original group of robotic musicians went by the name of **Tubeway Army**, but in Dragon circles this is the name given to a game from Crystal Computing On loading it appears to be yet another version of Scramble It is however one of the best versions and seems to have all the features of the arcade game

Initially you fly your craft across a sideways scrolling landscape avoiding rockets while bombing fuel dumps As you reach the cave system steering becomes more critical and you soon have to face swarms of the enemy coming towards you If you steer past these and negotiate the Wall and the final narrow tunnel you are faced with destroying the base before starting again There is some synthesised speech to accompany you on your journey and if you don't yet have a version of Scramble Tubeway Army is to be recommended

Design utility

The final program I've looked at is a graphics design utility from Orion Software called HiRes Although the Dragon has a good set of Basic commands it is easier to use a program like this to produce good drawings and these can then be used in your own programs More useful are probably those machine-code utilities that enable you to use new graphics keywords in Basic but this sort of program is a good start Dragon Data produced a similar program back in 1982 but joystick control was very difficult HiRes is a lot easier to use and can produce boxes, circles borders and repeated shapes over the screen The price is reasonable at £3 95

If I can drag myself away from the keyboard this month I might even join the crowds on their way to the sun As I lie on some distant shore I shall contemplate a world without aliens buzzards gorillas Cuthbert Horace and all their electronic friends After a few months of varied software in large quantities it is noticeable that the supply is starting to dry up One hopes that this is not a pattern for the future and that users will not be starved of Dragon fodder when they return to their micros ■



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Daisywheel or dot-matrix?

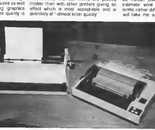
***Iolo ap Gwynn** compares the Shinwa CP80 printer with the Smith-Corona TP-1*

ONE OF THE ways in which the Dragon can be very useful is as a word processor — probably the only serious use to which many owners will ever put their machine. Many suitable packages have appeared on the market for this purpose, the Dragon Super Writer 2 probably being one of the most versatile, and the only one which can be considered for serious use on the 32 because it overcomes the machine's inherently slow keyboard response as well as giving an auto-repeat facility.

To complement word processing packages a good printer is needed in order to produce hard copies of your works of literary genius! A choice exists between dot-matrix machines, which have a large choice of characters and print sizes as well as the possibility of printing graphics screen dumps but whose print quality is not quite up to "letter quality" standards as is produced by an electric typewriter and a "daisywheel" printer. Daisywheel printers do not have the same range of readily available character sizes as a dot-matrix printer but produce print of "letter quality" standard and the print wheel itself can be changed for a different font should this be required. In this article I will take a look at two printers priced at about £250 each, the Shinwa CP80, a dot-matrix printer capable of "almost letter quality" print and the Smith-Corona TP-1, a daisywheel printer.

Where the Shinwa, as any dot-matrix printer, scores over the Smith-Corona is in its versatility and speed. In standard specification the Shinwa can handle both tractor (holes in the edges) paper and friction feed (like an ordinary typewriter), a full range of dot-matrix characters including the possibility of defining your own, provided you are good at machine code programming, as well as having graphics dumps, and a printing speed of 80CPS. This speed means it will print a full A4 page of text in about 90 seconds. The daisywheel on the otherhand, while giving an excellent print quality, can only handle friction feed (tractor feed is an optional extra), has a limited character set, and only prints at a speed of 12CPS. The same full A4 page of text takes about 7 minutes to be printed on this machine. I will now examine these machines in more detail.

First the Shinwa CP80. This is slightly more expensive than the Seikosha, but it does have features which are essential for use with any word processing package, such as the ability to use ordinary paper in friction feed mode as well as the usual perforated printer paper in the tractor mode. This printer is different from many other dot-matrix machines in that its pins are of square rather than round section. This means that the letters are printed thicker than with other printers giving an effect which is most acceptable and is definitely of "almost letter quality".



From left to right: the Smith Corona TP 1 and the Shinwa CP80 printers

Examples of its character print set are given in figure 1, printed in some of the various print sizes and fonts available. It is obvious from examining this list that this printer can cope with all the possible needs of a word processor and more. The character set available includes normal and italic characters as well as a set of semi-graphic characters and a set of playing card symbols. Its printing speed of 80 CPS or 640 dots/line/second is more than adequate. The normal line width maximum is 640 dots but in the compressed mode it will give 1 280 dots over the 190mm width of the line. The maximum width of paper which can be used is 254mm or 10 inches. Line spacing is normally set at $1/6$ of an inch, but is software switchable to any setting in increments of either $1/72$ of an inch or $1/216$. It is also capable of producing three carbon copies when printing.

The standard interface is the Centronics parallel which can be linked directly to the Dragon — using it with the Dragon presented no problems whatsoever. (For owners of other micros an RS232 serial interface is available as an optional extra.) A cartridge containing a carbon ribbon is supplied with the machine and this lasts a surprisingly long time. Replacements cost about £5, but I am sure an enterprising owner could easily reload the cartridge as it is not sealed. Print head life is quoted as 30 million characters. I find trying to estimate what this means in practical terms rather difficult, but get the feeling it will take me a long time to reach it — at least I hope that is the case!

The operation manual supplied with the printer is reasonably well written, although some parts have suffered somewhat in translation from the original Japanese. Some information for machine code use would however have been useful at times. It took me a while to sort out how to get the bit image mode to work properly. Reference to an Epson manual helped as the commands and control codes seem to be similar to those used in that machine. Needless to say it copes well with the listing of programs, the option of having the zero with or without a line through it being available according to the user's choice. Even without this, there is a noticeable difference between the zero and the "O". It also has available the "£" at ASCII 128 without the loss of the hash, as happens on a substantial number of other printers.

The other use to which the printer can be put is to produce a hard copy of the graphics screen, be they graphs or other drawings. The CP80 allows for the printing of graphics by means of its "Bit Image Mode" of operation. This allows the printing of rows of eight pixels at a time from the graphics screen This can be done using a Basic program but a single print of the screen would take 20 minutes or longer

For an immediate print at a reasonable speed of about 20 seconds one needs to resort to the use of machine code The main listing shows a Basic program to load a machine code routine to do just this Line 10 sets the space in the memory where the routine is to be stored Line 20 defines the memory position where the routine is to start This is higher than the position specified in line 10 because the memory reserved below it will be used to store values ready for printing Lines 30 to 130 read in the hexadecimal values given in the data statements on lines 150 to 250 Finally lines 1120 to 1160 provide a test printing circle on the graphics screen which is printed on calling the machine code routine in line 1170

Spaces

The routine as written will give a double-size printing of the graphics screen which measures about 160 by 115mm This is achieved by inserting a space in between each pixel printed An example of the resultant print is shown in figure 2 However should the need arise for a print without the inserted spaces the short second program should be run which modifies the original routine to eliminate the space insertion procedure Provided the listing is copied in carefully then no difficulty should be experienced in using this program However should anyone require a cassette of this program in both Basic and machine code loading I would only be too glad to let them have a copy for £3 50 (Write to I ap Gwynn Plas Treflys Llangwyryfon Aberystwyth)

How different the daisywheel printer is to use As with many such machines the TP 1 has only a limited printing speed However if one needs to produce high quality typed work then such a printer is essential Whereas the dot matrix printer responds to the whole 256 ASCII character set and control codes, the daisywheel is limited to 100 The control codes it recognises are those for backspace tab linefeed formfeed carrier return left and right margin set tab clear margin release and automatic underlining The main advantage of this is that one does not get involved in all the other software switchable options available on the dot-matrix

For straightforward word-processed output they are not normally needed (the full character set is seen in figure 3) Writing in Welsh (a must for the Dragon!) does however cause problems because the standard character set does not include a circumflex (ASCII 94) which is needed quite often Of greater interest to those wishing to produce program listings is that it does not have a "hash" character and more seriously the zero is identical to the letter "O" This could lead to some difficulty in following Basic listings printed on this machine

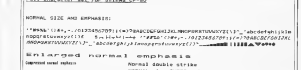
The instruction booklet is very clearly written and it is very easy to unpack the machine and connect it to the Dragon with a standard Centronics 36 pin D connector and cable (not supplied) An RS232 serial interface is also available for it as an optional extra and will accept data at a rate of anything from 50 to 19 200 baud The ribbon supplied is of the long life multistrike mylar film type which gives excellent print clarity Changing the ribbon cartridge is very easy but during normal use would not seem to be necessary very often Changing the printwheel is also easily done Several different types of typestyle wheels are available with a choice of both 10 and 12 pitch (characters per inch)

In construction this printer resembles a typewriter without a keyboard seems to be very solidly made and is quite heavy (9 4 Kg) In operation it sounds very much like a typewriter The roller width is 13 inches which is considerably more than the Shinwa, and it is possible to set the line advance manually to 6 4 5 or 3 lines per inch Fine adjustment of the print position can also be made so that printing on to forms and so on is possible The impression made by the printwheel characters can

▶

```
4 '************************************
5 'M/C PROGRAM TO DUMP GRAPHICS PAGES 1 TO 4
6 'FROM A DRAGON 32 ONTO A
7 'SHINWA CP80 PRINTER
8 'c 1 ap Gwynn 12/83
9 '************************************
10 CLEAR200,&H7CFF
20 X=&H7E00
30 READ X$
40 IF X>32767 OR X<&H7CFF THEN STOP
50 IF X$="ZZ"THEN 80
60 POKE X,VAL("&H"+X$)
70 X=X+1 GOTO 30
80 Y=&H7F00
90 READ X$
100 IF X>32767 OR X<&H7CFF THEN STOP
110 IF X$="ZZ" THEN 140
120 POKE Y,VAL("&H"+X$)
130 Y=Y+1:GOTO 90
140 GOTO1120
150 DATA34,36,8E,1D,E0,10,8E,7D,00,10,8F,7F E3,BD,7F,00,C6,C0,10,8E
160 DATA7D,00,F7,7F,E1,A6,84,43,8D,7F,26,BD,80,0F,86,00,BD,80,0F,39
170 DATA8B,E0,7A,7F,E1,F6,7F,E1,C1,00,26,E5,86,00,BD,80,0F,10,8E,7F
180 DATA00,10,BF,7F,E3,BD,7F,4F,30,89,18,01,8C,1E,00,26,CD,35,36,39
190 DATAZZ,86,1B,BD,80,0F,86,41,BD,80,0F 86,07,BD,80,0F,86 1B,BD,80
200 DATA0F,86,4B,BD,80,0F,86,00,BD,80,0F,86,01 BD,80,0F,39,12,12,12
210 DATA5F,46,56,56,46,56,56,46,56,56,46,56,E7,A4,7C,7F,E4,10,8E,7F
220 DATAE3,5F,46,56,56,46,56,56,46,56,56,46,56,F7,7F,E2,86,7F,E2,39
230 DATA12,12,8D,7F,00,C6,C0,F7,7F,E1,A6,A4,12,8D,80,0F,86,00,BD,80
240 DATA0F,31,A8,01,7A,7F,E1,F6,7F,E1,C1,00,26,E8,86,0D,BD,80,0F,39
250 DATAZZ
1120 PMODE4,1 SCREEN1,1'PCLS:
1130 COLOR0
1140 LINE(0,0)-(255,191),PSET,B
1150 CIRCLE(127,95),80
1160 FORI=1TO 5000:NEXT        1170 EXEC&H7E00
```

Listing 1 Basic program to load a machine code routine



Full character set for Shinwa CP-80

NORMAL SIZE AND EMPHASIS:

!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_'abcdefghijklm
nopqrstuvwxyz{|}£ '"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKL
MNOPQRSTUVWXYZ[\]^_'abcdefghijklmnopqrstuvwxyz{|}~ ▲▼♥♦♣♠

Enlarged normal emphasis

Compressed normal emphasis
Normal double strike
Normal emphasised
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NORMAL plus subscript

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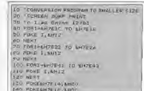
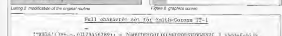


```
10 'CONVERSION PROGRAM TO SMALLER SIZE
20 'SCREEN DUMP PRINT
30 'c I.ap Gwynn 12/83
40 FORI=&H7E1C TO &H7E1E
50 POKE I,&H12
60 NEXT
70 FORI=&H7E22 TO &H7E26
80 POKE I,&H12
90 NEXT
100 FORI=&H7E41 TO &H7E43
110 POKE I,&H12
120 NEXT
130 POKE&H7E1A,&HE0
140 POKE&H7E1F,&HDC
```

Listing 2 modification of the original routine

Figure 2 graphics screen



Full character set for Smith-Corona TP-1

!"£$%&'()*+,-./0123456789:; = ?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[ ]_abcdefghijk
lmnopqrstuvwxyz

Figure 3 full character set for the Corona TP 1 daisywheel printer

◀ be controlled manually to five different settings. This enables sufficient pressure to be exerted for producing several carbon copies or for clear typing on to duplicator skins. The specification of this printer would seem to be up to the requirements of a business user and is very well made if a little noisy.

Deciding which of these two printers to use depends very much on the use to which they are to be put. Straightforward word processing and nothing else would suggest the daisywheel if high quality printing is required. However, if any program development work is done, rapid printing of reasonable quality is needed, or if graphics dumping is expected, then the Shinwa would cope adequately.

If the physical size of the printer is a consideration then the Smith-Corona TP 1 (made in the United States) is about four times the size of the Shinwa (made in Japan). Both machines have been designed to do different jobs, both do them well and bring quality printers down to a price many home micro owners would be prepared to consider. ■

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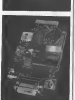


NORTH SEA OIL
MYSTERY OF THE JAVA STAR

Shards' diary

***Gordon Ross** tracks the movements of adventurers Shards software*

PETTIGREWS DIARY
EMPIRE

CLOADM and enter the world of Shards software, the family entertainment specialists. With 16 games under its belt including the best-selling Pettigrews Diary, Shards is the third largest producer of Dragon software — following on the heels of Salamander and Microdeal

The man behind the mysterious adventures and founder of the Shards empire is managing director Stephen Maltz His interest in programming stems from a competition he won in 1980 to rank 10 different business computers in order of preference Stephen won a Superbrain micro, a case of champagne and the opportunity to take time off from his job as a Systems Analyst with Berger Paint to write programs

Early days

The Superbrain gave Stephen an appreciation of micros in general and in the summer of 1982 he purchased a Dragon 32 His first programs appeared four months later competing for his attention with a blaring TV set and a noisy child

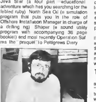
In September of 1982 Stephen approached Dragon Data at the Personal Computer World exhibition and asked them to look at two of his programs The response was less than enthusiastic — they lost his tapes twice Nevertheless Stephen persevered with his programming and the two games that Dragon Data ignored later turned up on Shards Fun and Games tape — a compendium of 10 games for children s parties

A two centimetre high classified advertisement in a well known popular computer weekly magazine was the first indication that Shards was on the go For almost a year Stephen ran Shards as a mail order venture In June of 1983 he gave up his job to run Shards full time and took on two staff to help with the packaging and processing of the mail-order business

One of the first successfully marketed adventures that Shards had on the Dragon was one that Stephen actually wrote on the Superbrain and converted to the Dragon — Empire At the start of the game the world is shown as consisting of 39 neutral blocks to be divided up between the player the Dragon Empire and neutral countries Having allocated your forces the idea is to strengthen your hold on the world forcing the opposing forces into submission

This was followed shortly afterwards by the release of Shards most popular adventure, Pettigrews Diary which has sold upwards of 10 000 copies The adventure is in three chapters each being an adventure in its own right and loading separately Clues gained in each section, however, are essential to the following part The first part takes place in a burning farmhouse — you have to extract vital clues to escape the flames and continue to the second part of the quest in London collecting more clues and outrunning a clock ticking away at the top of the screen Finally the last stage of the adventure takes you around Europe, piecing various puzzles together in order to successfully end the search

The triumph of Pettigrew has led to a series of new releases over the last year and a half including Puzzler (a computer simulated jigsaw puzzle), Mystery of the Java Star (a four part "educational" adventure which has you searching for the fabled ruby) North Sea Oil (a simulation program that puts you in the role of Offshore Installation Manager in charge of a drilling rig) Shaper (a sound utility program with accompanying 36 page booklet) and most recently Operation Safras the "prequel" to Pettigrews Diary



The man at the top — Stephen Maltz

Most of these titles have had only limited sales success averaging approximately 2 000 sales per title Thus the recent collapse of Dragon Data couldn t have happened at a worse time for Shards, coming as it did when sales are traditionally low over the whole spectrum of the micro industry

As a result many shops are reducing prices notably Boots and Dixons in a bid to sell off unwanted stock And according to Stephen since Dragon s collapse Shards has had trouble in getting its new stock into the hands of distributors and retail outlets leading to a fall in revenue and rise in the importance of mail order — a situation that sees Shards going back to its original position

Operation Safras for example has had very disappointing sales although Stephen believes it to be a better adventure than Pettigrews Diary "The public believes that it is all plain sailing," said Stephen "yet if they saw that companies were in trouble they would support them" Stephen said that recent titles that Shards has been working on have had to be shelved This includes Time Travelling an adventure written entirely in graphics, incorporating a sprite utility in the program and Shards major project for 1984 which was to have been an educational adventure using music graphics and coming complete with books and instructions

Shards has put its faith in the family market Stephen believes that it is preferable to have several members of a family or group playing and discussing an interesting adventure rather than seeing a single person blasting away zapping aliens and hogging the TV set In addition, says Stephen families are less likely to pirate tapes

Hand in hand with this goes the belief that more adults will join in the playing of adventure-type games My philosophy is that the market will change — we are aiming at families and mature audiences now so that when the market does change we will be in a strong position

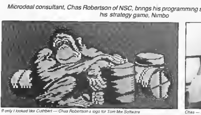
The ideal micro

At present Shards employs five full time staff and several part time programmers "most of whom are 30 year old men with two children" says Stephen belying the whizz kid image of the industry It takes about three months to write an adventure according to Stephen who says that an original idea and sound technique are the two most important facets of an adventure Stephen, who does most of the programming for the Dragon — his other staff members are mostly concerned with writing adventures for the Commodore 64 and Spectrum — claims that the Dragon with its amazingly powerful Basic is the ideal micro for the programmer Indeed it s only lately that Shards has diversified away from the Dragon Stephen believing that the road to the future depends on small companies specialising in one area — such as adventures rather than producing software for one particular micro

Although the immediate outlook is gloomy this is not necessarily the end of Shards associations with the Dragon Recently several people have approached Shards with the possibility of developing adventures on the Dragon Come October the time for decision making and the launch of new products will begin Only then will a decision be taken on whether or not to continue with the Dragon ■

In search of excellence

Microdeal consultant, Chas Robertson of NSC, brings his programming skills into your home with his strategy game, Nimbo



If only I looked like Cuthbert — Chas Robertson's logo for Tom Mix Software

Chas — on the hotline

NIMBO IS A GAME of skill and strategy which has you pitting your wits against the Dragon in order to see who is forced to take the last square from the board Full instructions are contained in the program which was written by Chas Robertson of Northern Software Consultants best known for the work he does for Microdeal

Chas a chartered engineer began working for Microdeal two years ago at about the same time that he set up his own consultancy company His largest customer is Microdeal for whom he does all the Tandy to Dragon conversions from tapes received from Tandy in America He also has the job of converting Dragon tapes to the Color Computer

Converting a Tandy tape to the Dragon is not an easy process says Chas We only get the finished program not the source tape so we have to disassemble it examine the contents locate the areas that need changing make the changes and check to see if they work It is a long process which requires continual checking and counter checking

Chas's other major project for the Dragon involved the design of the software key or "dongle" that Microdeal launched with Buzzard Bait in order to combat piracy

Besides his work for Microdeal and the Dragon Chas has also worked on graphic designs for the Commodore 64 Z80 and Color Computer He has a pool of four specialists who he can contract work out to and will undertake a wide spectrum of projects from electronics design to adding finishing touches to software ■

```
80 CLEAR2000
90 DIM A(15), B(15):T=15
100 FOR X= 1 TO 15
110 READ A(X)
120 NEXT X
130 FOR X= 1 TO 3:READ B$(X):NEXTX
140 FOR X= 1 TO 3:READ C$(X):NEXTX
150 GOSUB 1070
160 CLS:GOSUB 670
170 REM HUMANS MOVE
180 PRINT@ 448,"REMOVE HOW MANY BO
XES (1-3)";
190 INPUT H
200 IF H<1 OR H>3 THEN PRINT@448,S
TRING$(26,143);:GOTO180
210 IF H>T THEN 180
220 FOR X=1 TO H
230 PRINT@448,STRING$(32,143);
240 PRINT@ 448,"  BOX #";X;
250 INPUT H(X)
260 IF H(X)>15 OR H(X)<1 THEN 240
270 IF B(H(X))=0 THEN GOSUB 400:GO
TO 240
280 B(H(X))=0
290 NEXT X
300 FOR X= 1 TO H
310 SOUND 200,1
320 PRINT@ A(H(X)),E$;
330 PRINT@ A(H(X))+32,E$;
340 FOR Y=1 TO 500:NEXT Y
350 NEXT X
360 T=T-H
370 P$="HUMAN"
380 GOTO 870
390 REM INVALID CHOICE
400 PRINT@448,"THAT BOX WAS REMOVE
D"
410 FOR Y= 1 TO 1500:NEXT Y
420 PRINT@448, STRING$(26,143);
430 RETURN
440 REM COMPUTERS MOVE
450 PRINT@448,"my turn"
```

```
460 FOR X=1 TO 1000:NEXT X
470 IF T=15 THEN H=2
480 IF T=13 OR T=9 OR T=5 THEN H=1
490 IF T=14 OR T=10 OR T=6 THEN H=
1
500 IF T=12 OR T=8 OR T=4 THEN H=3
510 IF T=11 OR T=7 OR T=3 THEN H=2
520 IF T=2 THEN H=1
530 IF T= 1 THEN H=1
540 FOR X= 1 TO H
550 Y=RND(15)
560 IF B(Y)=0 THEN 550
570 H(X)=Y
580 B(H(X))=0
590 NEXT X
600 FOR X= 1 TO H:PRINT@ A(H(X)),E
$;:PRINT @ A(H(X))+32,E$;:SOUND 10
0,1
610 FOR Y= 1 TO 500:NEXT Y
620 NEXT X
630 PRINT@448,"i chose:";:FOR X= 1
 TO H:PRINTH(X);:NEXT X
640 FOR Y=1 TO 1000:NEXT Y
650 T=T-H:P$="COCO":GOTO 870
660 REM set-up screen
670 PRINT@0, STRING$(32,191);
680 PRINT@416,STRING$(32,191);
690 FOR Y= 1 TO 27
700 SET(0,Y,4):SET(63,Y,4)
710 NEXT Y
720 A$=CHR$(175)+CHR$(175)+CHR$(17
5)+CHR$(170)
730 FOR X= 1 TO 15
740 PRINT@ A(X),A$;:PRINT@ A(X)-32
,X;
750 PRINT@137,LEFT$(B$,15);
760 PRINT@ A(X)+32,A$;
770 PRINT@230,LEFT$(B$,20);
780 NEXT X
790 PRINT@324,B$;
800 PRINT@13,"NIMBO";
810 FOR X= 1 TO 15
820 B(X)=1
830 NEXT X
840 E$=CHR$(143)+CHR$(143)+CHR$(14
3)+CHR$(143)
850 RETURN
860 REM  check for win/lose
870 IF T=0 AND P$="HUMAN" THEN PRI
NT @ 448,C$(RND(3));:COCO=COCO+1:G
OTO 900
880 IF T=0 AND  P$="COCO" THEN PRI
NT@ 448,B$(RND(3));:HUMAN=HUMAN+1:
GOTO900
890 IF P$="HUMAN" THEN 450 ELSE 18
0
900 FOR X= 1 TO 2000:NEXT X
910 PRINT @ 448,NM$;HUMAN
920 PRINT@465,"NIMBO";COCO
930 PRINT @ 480,"care to play agai
n?";
940 A$=INKEY$:IF A$="" THEN 940
950 IF A$="N" THEN CLS:END
960 FOR X= 1 TO 15:B(X)=1:NEXT X
970 T=15:GOTO160
980 DATA 68,73,78,83,88
990 DATA 196,201,206,211,216
1000 DATA 324,329,334,339,344
1010 DATA you win-luck is with you
 human
1020 DATA beware-nimbo is a poor l
oser

1030 DATA ha' nimbo just let you w
in'
1040 DATA stupid human-why don't y
ou try?
1050 DATA i won without even conce
ntrating
1060 DATA the superior mind has wo
n again'
1070 CLS0
1080 PRINT @ 105,"CAN YOU OUTWIT";
1090 PRINT @ 137,"  THE MIGHTY  ";
1100 PRINT @ 169,"    NIMBO?    ";
1110 FOR X= 1 TO 1500:NEXT X
1120 PRINT @ 321," WHAT IS YOUR NA
ME, O UNWISE  ";
1130 PRINT @ 353,"     CHALLENGER
          ";
1140 PRINT@369,"";:INPUT NM$
1150 CLS0
1160 PRINT@32,"     NEED INSTRUCTI
ONS(Y/N)";:INPUT A$:IF A$="N" THEN
 RETURN
1170 FOR X= 1 TO 500:NEXT X
1180 PRINT @ 96," YOU HAVE TAKEN I
T UPON YOUR-   ";
1190 PRINT @ 128," SELF TO TRY TO
OUTWIT THE       ";
1200 PRINT @ 160," MOST-WISE NIMBO
. THE TASK       ";
1210 PRINT @ 192," BEFORE YOU IS T
O REMOVE         ";
1220 PRINT @ 224," EITHER 1,2 OR 3
 BLUE BOXES      ";
1230 PRINT @ 256," ON YOUR TURN, A
ND SOMEHOW       ";
1240 PRINT @ 288," FORCE ME TO TAK
E THE LAST       ";
1250 PRINT @ 320," BOX. BUT, IF I
FORCE YOU TO     ";
1260 PRINT @ 352," TAKE THE LAST B
OX, YOU HAVE     ";
1270 PRINT @ 384," AGAIN DEMONSTRA
TED YOUR LACK    ";
1280 PRINT @ 416," OF WISDOM AND T
HE POWER OF      ";
1290 PRINT @ 448," NIMBO'
          ";
1300 PRINT@ 484,"  PRESS ENTER TO
PLAY";:INPUT A$
1310 RETURN
1320 Y=RND(15):PRINT Y;:GOTO 1320
```

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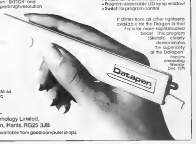

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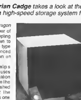
Kick start for Ultra Drive

***Brian Cadge** takes a look at the Ultra Drive — a high-speed storage system for the Dragon*

FROM THE letters we receive at *Dragon User* it is obvious that quite a number of readers spend a lot of their time grappling with cassette recorders, trying in vain to load that program that took hours to type in. At last there is a reasonably priced solution — for just £80 you can own an Ikon Ultra Drive.

The Ultra Drive is based on a Philips mini digital cassette recorder, which uses cassettes similar to those used in dictation machines. For your cash you'll receive the Drive itself in a sturdy metal case finished in the same livery as the Dragon 32, the interface cartridge and a manual, plus one blank mini cassette to get you started.

The interface is the same size as a standard Dragon cartridge and plugs in as normal, the only difference being the 12 inches of ribbon cable which protrudes out to connect to the drive.


The Drive a sturdy metal case from Ikon

Looking in

Taking a look inside revealed a very simple circuit board, just a 4k eprom to hold the extensions to Basic, a 6821 PIA (the same chips are used inside the Dragon to control I/O operations), and a few resistors and transistors. Unfortunately, the cartridge is an extremely tight fit; whilst this will certainly prevent any crashes due to bad connections, I wouldn't speculate how long the Dragon's edge connector would stand up to the strain of repeatedly plugging and unplugging the cartridge. All the power for the interface and the drive are taken directly from the computer.

There are no external controls except for the eject button, as all operations are controlled by the computer. For example, to rewind a tape in the drive you simply enter the command REWIND. Similarly, to advance (or fast-forward) the tape there is the ADVANCE command. Both of these immediately return the OK prompt — once the drive has been sent a command it gets on with it on its own.

In operation the Ultra Drive is essentially a fast and very reliable cassette recorder — that is, you must position the tape in the correct place to record the next program. (Unlike a disk drive, the Ultra Drive does not do this for you.) There is a SKIP command which acts like the SKIPF command to help position the tape for reading or writing. When loading a file, it is important to make sure that the tape is somewhere before the file or the drive will reach the "End of Files" and give up the search — it will not automatically rewind to carry on looking. There are thankfully no I/O errors for starting a tape mid-way through a recording.

The first thing to be done on a new tape is to type INIT, which initialises the tape directory and prepares the cassette for recording. Saving and loading Basic programs is identical to using the normal cassette, except that "Save" and "Load" are used rather than "Csave" and "Cload". In addition, if the first character of a filename is "!" the program is saved as a protected file. This means any attempt to read or append the program will result in it autorunning with the break key disabled. Similar commands "Savem", "Loadm" and "Runm" exist for machine code programs.

Once you have several files on a tape you may start forgetting where programs are. The DIR command will first rewind the tape and then list each filename on the tape together with the type of file, its length, start and execute addresses. Only the name and type is displayed for a protected file.

The area which I thought the Ultra Drive would probably be most useful turned out to be the most disappointing feature — file handling. Although the Dragon's cassette filing system is slow and not very reliable, it is quite sophisticated. Similar commands have not been implemented on the Ultra Drive. There are just two filing commands — SAVED and LOADD. These will save and load whole or chunks of arrays on to the drive. The arrays can be numeric or character, although the manual only mentions numeric arrays.

The inclusion of these commands mean that it is not impossible to do file handling programs (such as databases) on the Ultra Drive, but it is certainly not as flexible as the Dragon's own COS.

In addition to the Ultra Drive commands there are a few (very easily implemented) additions to Microsoft. These are Break ON and OFF, to disable the Break key, Fast and Slow, which do the same as the high speed poke and so cause some Dragons to crash, and finally OLD, which will recover a Basic program after it has accidentally been NEWed, provided no new lines have since been entered. I would have preferred to see more useful commands like automatic line numbering and error trapping implemented, rather than these cosmetic commands such as FAST & SLOW.

Error messages

A first feature which I disliked in the OS was its error handling. Whilst error messages are in nice plain English, such as "No tape" and "End of Files", if these occur during a program they are printed on the screen, but the program does not stop and there is no error trapping or detection included. This could create chaos in a program which loads arrays from the drive if the user forgets to put the tape in, or puts the wrong tape in.

Although there are features I would like to see improved, the Ultra Drive's good points far outweigh the bad. The system proved to be very reliable in use, has a capacity of 200k per cassette, and is some 10 times faster than a normal cassette. A good quality tape recorder will cost around £40 anyway, so for just £80 the Ultra Drive is very good value for the User who is tired of cassettes but cannot afford to move up to a disk drive. ■

The Ultra Drive costs [illegible] £3.45 p&p. A box of 5 cassettes costs £20.13.

Both are available from Ikon Computer Products, Dept B, Kiln Lake, Laugharne, Dyfed SA33 4QE. Tel: 099 421515 for further information.

Plug in, switch on and go . . .

***Keith and Steven Brain** look at a handy RS232 I/O port interface*

THE ABSENCE of a serial port on the Dragon 32 prevents communications with RS232 devices such as printers other micros modems and so on. As a result a number of suitable RS232 interfaces have appeared. In addition interest in using the Dragon to monitor and control external events is increasing and dedicated I/O ports are therefore also becoming available. The most recent interface on offer is the rather unusual RS232 I/O Port Interface from Steve's Electronics Supply (an established Dragon Service Agent who has recently entered the Dragon add-on market)

User-friendly

It differs from previous units which we have seen in that it houses not only a standard RS232 port but also a comprehensive two-port parallel input/output facility and provides straightforward user-friendly access through the extension of the standard Basic command set. In addition to a 6551 Universal Asynchronous Receiver Transmitter the unit uses the very powerful 6522 Versatile Interface Adaptor which provides not only two eight bit parallel ports but also handshaking lines for bi-directional data transfer two 16 bit programmable timers, and a synchronous/asynchronous shift register

This is a very professionally produced unit and it is housed in a custom ABS cartridge (about the size of a disk controller) A good example of the fine attention paid to detail in the design is the fact that not only are two integral legs incorporated into the case, but two lugs moulded on to the front edges to provide a snug fit so that the unit does not have to rely on the ability of the edge connector to defy gravity. Power is taken directly from the Dragon (with a red LED power-on indicator) and both a 25-way D type RS232 socket and a 40-way IDC I/O port socket are provided

Removing the lid reveals a neatly laid out PCB bearing the respected name of Race Electronics. Notable features are a 2716 Eprom containing the operating system software a 6522 VIA a 6551 UART the crystal, and a multiple DIP switch allowing reconfiguration of the RS232 port as Data Communication Equipment or Data Terminal Equipment. Only RTS (Request to send) and CTS (Clear to send) signals are used.

On power up the standard Dragon start message is supplemented by the words Extended Control Basic and the full features of the unit are now easily available through 13 new Basic commands rather than the more usual PEEKing and POKEing. BAUD sets the baud rate between 50 and 19 200 whilst TERM provides a very simple terminal emulator where ASCII control codes 0 to 26 are available by pressing Shift and the appropriate letter

The RS232 plugs in

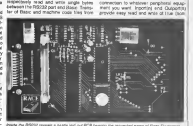
Selection of RS232ON echoes all keyboard input to the RS232 port and RS232 port input to the screen until RS232OFF is selected. INBYTE(0) and SPO are more selective commands which respectively read and write single bytes between the RS232 port and Basic. Transfer of Basic and machine code files from Dragon to Dragon is well supported. SSAVE and SLOAD transfer ASCII format ("spooled") Basic programs with file searching whilst SSAVEM and SLOADM transfer binary data in Intellec hex format

Detailed manual

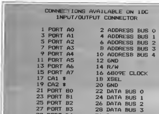
The data format and transmission protocol for these commands are described in detail in the manual so that transfer to and from other machines can be catered for. But whilst testing out the unit we were interested to discover that if RS232ON was selected and a Basic program file uploaded from a Tandy 100 via its inbuilt Telecom package then the Dragon would happily accept this as keyboard input and crunch it as usual (at least at low baud rates)

The 6551 UART is set up by default for the most usual RS232 data format (1 start, 8 data 2 stop bits no parity) but if necessary this can be modified. This is the only command not included in the extension to Basic but is accomplished by POKEing to the command and control registers at &HF002 and &HF003

The 6522 I/O lines and many of the 6809 bus lines are brought out to the 40 way IDC connector and are thus available for connection to whatever peripheral equipment you want. Inport(n) and Outport(n) provide easy read and write of true (non



Inside the RS232 reveals a neatly laid out PCB bearing the respected name of Race Electronics



```
        CONNECTIONS AVAILABLE ON 1DC
          INPUT/OUTPUT CONNECTOR

  1 PORT A0            2 ADDRESS BUS 0
  3 PORT A1            4 ADDRESS BUS 1
  5 PORT A2            6 ADDRESS BUS 2
  7 PORT A3            8 ADDRESS BUS 3
  9 PORT A4           10 ADDRESB BUS 4
 11 PORT A5           12 GND
 13 PORT A6           14 R/W
 15 PORT A7           16 6809E CLOCK
 17 CA1 *             18 XSEL
 19 CA2 *             20 GND
 21 PORT B0           22 DATA BUS 0
 23 PORT B1           24 DATA BUS 1
 25 PORT B2           26 DATA BUS 2
 27 PORT B3           28 DATA BUS 3
 29 PORT B4           30 DATA BUS 4
 31 PORT B5           32 DATA BUS 5
 33 PORT B6           34 DATA BUS 6
 35 PORT B7           36 DATA BUS 7
 37 CB1 *             38 +5V
 39 CB2 *             40 +5v

        * port handshake signals
```

inverted) 8-bit values at I/O PORT A or B with automatic configuration to the appropriate mode

Inbyte (4.15) allows reading of the VIA registers whilst the VIA command allows write only access to these registers. The manual stresses the complexity of the 6522 (and the desirability of getting your hands on a data sheet) but gives some practical examples involving monitoring, switching, square wave generation and timing.

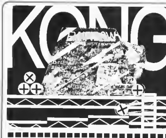
Everyone still laughs at Uncle Clive's exaggerated claim that you could control a power station with a ZX81, but with this unit attached to your Dragon you could certainly get to grips with some interesting control applications whether they involve running your model railway, robot arm, central heating, burglar alarm system or more serious projects. Care must be taken to ensure that additional circuitry does not draw too much power from the Dragon, but even mains loads can be switched directly via solid state relays.

Incompatible

As it stands the unit is not compatible with the Dragon 64 (which already has an RS232 port anyway) as it calls one of the "corrected" ROM routines (USR(09)). Also, there is some doubt whether the original power supply on the 64 is powerful enough to take on the additional load imposed by the unit in addition to 64K of RAM.

The price of the unit is £54.50, with the full technical manual being available for a further £4.50, and as the "going rate" for even the simplest RS232 interface seems to be around £50 it certainly offers excellent value for money.

The bare case, a prototyping board and two versions of an Eprom programmer are also available and we hope to include a review of the latter in a forthcoming issue of *Dragon User*. For further details contact Steve's Electronics Supply Company, 35 Castle Arcade, Cardiff CF1 2BW, tel (0222) 41905 ■



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DRAGON OPEN FILE

Send us your Dragon programs, beginning with a general description and then explaining how the program is constructed Take care that the listings are all bug free, enclosing a cassette and, if possible, a printout We pay £6 for each original bug-free program published, double for the program of the month If you have any problems with the listings please send your queries to the appropriate author, *Dragon User*, 12-13 Little Newport Street London WC2R 3LD

Escape

From Lam Huyen Le in North London

THIS PROGRAM was written in low resolution graphics by using CHR$ command to print the maze and objects

In this program you control a small flashing square at the bottom of the screen Your job is try to eat all the objects in orange and [illegible] domly around the screen You must do this in time or without hitting into the maze You can also use a bomb to break the maze if you get stuck but you will lose a life each time you do this You have five lives and three levels to play but you need a certain number of points to transport into the next one

Program notes

10 180	Instructions
200 690	Set screen and prints maze
700-820	P[illegible]
830 940	Prints your block score and lives and checks keys
950-970	Score check
980-1130	Movement routine
1170-1270	Sets maze and new time for level 2
1280 1320	Bombs routine
1330 1410	Set maze and time for level 3
1420-1510	Winning routine
1520-1800	Lose routine and end of game

```
10 REM********THIEF MAN********
20 REM***BY LAM HUYEN LE .84***
30 CLS0:PRINT@167,"M A Z E   T H I
 E F";:SCREEN0,1
40 PRINT@230,"BY  LAM HUYEN LE 198
4";:SCREEN0,1
50 FORI=1TO2000:NEXT
60 PRINT@328,"INSTRUCTIONS(Y/N)";:
SCREEN0,1
70 A$=INKEY$:IF A$=""THEN 70
80 1F A$="Y"THEN 100
90 IF A$="N"THEN 150 ELSE 70
100 CLS3:PRINT@0,STRING$(32,233);:
PRINT@480,STRING$(31,233);
101 FORT=32TO448STEP32:PRINT@T,CHR
$(233);:PRINT@T+31,CHR$(233);:NEXT
:PRINT@33, "****<<<<<INSTRUCTIONS>
>>>>****" ;:SCREEN0,1
102 PRINT@98,"THE OBJECT IS TO PIC
K UP MANY";
103 PRINT@130,"OBJECT (ORANGE AND
PURPLE) AS";
104 PRINT@161,"YOU CAN WITHOUT HIT
ING YOUSELF";
105 PRINT@194,"INTO THE WALL (BLUE
 MAZE)...";
106 PRINT@225,"YOU CONTROL THE SMA
LL FLASHING";
107 PRINT@258,"BY USING THE FOUR A
RROW KEYS";
108 PRINT@290,"YOU CAN ALSO USE TH
E SPACEBAR";
109 PRINT@322,"TO BLOW THE WALL BU
T YOU WILL";
110 PRINT@354,"LOSE A LIVE EACH TI
ME";
111 PRINT@418,"PRESS SPACEBAR TO S
EE MORE..";
112 SCREEN0,1
113 IF INKEY$<>" "THEN 113
114 CLS7:PRINT@0,STRING$(32,233);:
PRINT@480,STRING$(31,233);
115 FORT=32TO448STEP32:PRINT@T,CHR
$(233);:PRINT@T+31,CHR$(233);
116 NEXT
117 PRINT@34,"THERE ARE THREE LEVE
L TO PLAY";
118 PRINT@66,"THE FIRST ONE HAS OR
DER MAZE";
119 PRINT@98,"YOU NEED TO GET MORE
 THAN 700";
120 PRINT@130,"POINTS AND MUST GET
 THROUGH";
121 PRINT@162,"THE DOOR (WHITE) TO
 GO ON TO";
122 PRINT@194,"THE NEXT LEVEL...";
123 PRINT@226,"HOWEVER IF YOU DON'
T FINISH";
124 PRINT@258,"IN TIME YOU W1LL BE
 SEND TO";
125 PRINT@290,"JAIL. ALSO IF YOU G
O ON TO ";
126 PRINT@322,"THE DOOR AND DON'T
HAVE A";
127 PRINT@354,"R1GHT NUMBER OF POI
NTS YOU ";
128 PRINT@386,"INSTANLY WIPE THE D
OOROFF ";
130 PRINT@450,"PRESS SPACE BAR TO
SEE MORE.";
131 SCREEN0,1
132 IF INKEY$<>" "THEN 132
133 CLS5:PRINT@0,STRING$(32,233);:
PRINT@480,STRING$(31,233);
```

```
134 FORT=32TO448STEP32:PRINT@T,CHR
$(233);:PRINT@T+31,CHR$(233);:NEXT
T
135 PRINT@34,"ON LEVEL TWO AND THR
EE THE ";
136 PRINT@66,"WALLS ARE SET RANDOM
LY SO YOU";
137 PRINT@98,"HAVE TO SORT YOURSEL
F OUT  ";
138 PRINT@130,"QUICK AS POSIBLE.
YOU NEED";
139 PRINT@162,"MORE THAN 1500 POIN
TS TO GO";
140 PRINT@194,"ON TO LEVEL THREE A
ND 2500 ";
141 PRINT@226,"POINTS TO WIN THE G
AME";
142 PRINT@258,"YOU HAVE 5 LIVES AN
D EACH ";
143 PRINT@290,"TIME YOU HIT YOURSE
LF OR USE";
144 PRINT@322,"A BOMB A LIVE WILL
BE LOSE ";
145 PRINT@354,"AND REMEMBER THAT Y
OU ONLY ";
146 PRINT@386,"HAVE A LIMIT OF TIM
E ";
147 PRINT@450,"PRESS SPACEBAR TO S
TART...";:SCREEN0,1
148 IF INKEY$<>" "THEN 148
150 CLSRND(8)
160 PRINT@235,"GOOD LUCK";:SCREEN0
,1
170 TUNE$="O3L2.BL4BO4L4CCP4O3L4BO
4L4CO3L4BAGL1F#P4O4L2DCO3L8BGO4L8C
O3L8AO4L4DCO3L2BAL1G;"
180 PLAY"T6XTUNE$;T10XTUNE$;"
200 CLS0
210 X=32:Y=29:SC=0:L=5
220 FORI=0TO14
230 PRINT@0+I,CHR$(175);
240 PRINT@17+I,CHR$(175);
250 PRINT@448+I,CHR$(175);
260 PRINT@465+I,CHR$(175);:NEXT
270 FORI=0 TO384 STEP32
280 PRINT@32+I,CHR$(175);
290 PRINT@63+I,CHR$(175);:NEXTI
300 FORI=1TO4
310 PRINT@65+I,CHR$(175);
320 PRINT@74+I,CHR$(175);
330 PRINT@80+I,CHR$(175);
340 PRINT@89+I,CHR$(175);
350 PRINT@129+I,CHR$(175);
360 PRINT@138+I,CHR$(175);
370 PRINT@144+I,CHR$(175);
380 PRINT@153+I,CHR$(175);
390 PRINT@193+I,CHR$(175);
400 PRINT@202+I,CHR$(175);
410 PRINT@208+I,CHR$(175);
420 PRINT@217+I,CHR$(175);
430 PRINT@257+I,CHR$(175);
440 PRINT@266+I,CHR$(175);
450 PRINT@272+I,CHR$(175);
460 PRINT@281+I,CHR$(175);
470 PRINT@321+I,CHR$(175);
480 PRINT@330+I,CHR$(175);
490 PRINT@336+I,CHR$(175);
500 PRINT@345+I,CHR$(175);
510 PRINT@385+I,CHR$(175);
520 PRINT@394+I,CHR$(175);
530 PRINT@400+I,CHR$(175);
540 PRINT@409+I,CHR$(175);
550 NEXT
560 FORI=1TO3
570 PRINT@70+I,CHR$(175);
580 PRINT@85+I,CHR$(175);
590 PRINT@134+I,CHR$(175):
600 PRINT@149+I,CHR$(175);
610 PRINT@198+I,CHR$(175);
620 PRINT@213+I,CHR$(175);
630 PRINT@262+I,CHR$(175);
640 PRINT@277+I,CHR$(175);
650 PRINT@326+I,CHR$(175);
660 PRINT@341+I,CHR$(175);
670 PRINT@390+I,CHR$(175);
680 PRINT@405+I,CHR$(175);
690 NEXT
700 TIMER=0
710 T=0
720 FORI=1TO2
730 PRINT@14+I,CHR$(207);
740 NEXT
750 R=RND(29):PRINT@33+R,CHR$(255)
760 R=RND(29):PRINT@99+R,CHR$(255)
;
770 R=RND(29):PRINT@161+R,CHR$(255
);
780 R=RND(29):PRINT@225+R,CHR$(255
);
790 R=RND(29):PRINT@289+R,CHR$(255
);
800 R=RND(29):PRINT@353+R,CHR$(255
);
810 R=RND(29):PRINT@417+R,CHR$(255
);
820 R=RND(480):PRINT@0+R,CHR$(223);
830 PRINT@480,"**SCORE:";SC;
840 PRINT@495,"LIVES:";L;
860 IF TIMER>1500 +T THEN 1530
870 SET(X,Y,2)
880 PLAY"O4L200AA"
890 RESET(X,Y)
900 IF PEEK(341)=223 THEN GOSUB 980
910 IF PEEK(342)=223 THEN GOSUB 10
20
920 IF PEEK(343)=223 THEN GOSUB 10
60
930 IF PEEK(344)=223 THEN GOSUB 11
00
940 IF PEEK(345)=223 THEN GOSUB 12
80
950 IF POINT(X,Y)=8 THEN SC=SC+100
+RND(100) ELSE IF POINT(X,Y)=6 THE
N SC=SC+RND(500)+100
960 IF SC>=700 AND POINT(X,Y)=5 TH
```

Continued on page 32

```
EN 1170 ELSE IF SC>=1500 AND POINT
(X,Y)=4 THEN 1330
962 IF SC>=2500 AND POINT(X,Y)=7 T
HEN 1430
964 IF L=0 THEN CLSRND(8):PRINT@22
8,"YOU LOST ALL LIVES.YOUR SCORE I
S";SC;:PRINT:PRINT"PRESS SPACEBAR
TO PLAY AGAIN";:GOSUB 1700
970 GOTO 830
980 Y=Y-1
990 IF POINT(X,Y)=3 THEN Y=Y+2:SOU
ND200,2:L=L-1:IF POINT(X,Y)=5 AND
SC<=700 THEN Y=Y+2:IF POINT(X,Y)=4
 AND SC<=1500 THEN Y=Y+2
1000 IF Y=0 THEN Y=1
1010 RETURN
1020 Y=Y+2
1030 IF POINT(X,Y)=3 THEN Y=Y-2:SO
UND200,2:L=L-1:IF POINT(X,Y)=5 AND
 SC<=700 THEN Y=Y-2:ELSE IF POINT(
X,Y)=4 AND SC<=1500 THEN Y=Y-21040
 IF Y=31 THEN Y=30
1050 RETURN
1060 X=X-2
1070 IF X=0 THEN X=1
1080 IF POINT(X,Y)=3 THEN X=X+2:SO
UND200,1:L=L-1:IF POINT(X,Y)=5 AND
 SC<=700 THEN X=X+2:ELSE IF POINT(
X,Y)=4 AND SC<=1500 THEN X=X+21090
 RETURN
1100 X=X+2
1110 IF X=63 THEN X=62
1120 IF POINT(X,Y)=3 THEN X=X-2:SO
UND 200,1:L=L-1:IF POINT(X,Y)=5 AN
D SC<=700 THEN X=X-2:IF POINT(X,Y)
=4 AND SC<=1500 THEN X=X-2
1130 RETURN
1140 FORI=1TO2
1150 PRINT@14+I,CHR$(128);
1160 NEXTI:RETURN
1170 CLS0:FORM=1TO510
1180 S=RND(4)
1190 IF S=2 THEN PRINTCHR$(175); E
LSE PRINTCHR$(128);
1200 NEXT M
1210 TIMER=0
1220 T=200+RND(100)
1230 Z=RND(480)
1240 FORI=1TO2
1250 PRINT@Z+I,CHR$(191);:NEXTI
1260 GOTO750
1270 RETURN
1280 RESET(X-1,Y-1):RESET(X,Y-1):R
ESET(X+1,Y-1)
1290 RESET(X-1,Y):RESET(X+1,Y):RES
ET(X-1,Y+1)
1300 PLAY"O3V31T10L10CCCCCCCCCC"
1310 L=L-1
1320 RETURN
1330 CLS0:FORA=1TO510
1340 R=RND(3)
1350 IF R=3 THEN PRINT CHR$(175);E
LSE PRINT CHR$(128);
1355 NEXTA
1360 TIMER=0
1370 T=300+RND(100)
1380 W=RND(510)
1390 PRINT@W,CHR$(239);
1400 GOTO750
1405 IF POINT(X,Y)=7 THEN L=L-1
1410 RETURN
1420 REM***WIN ROUTINE***
1430 CLSRND(8)
1440 RR=128+RND(127)
1450 FORI=1 TO 16
1460 PRINT@232+I,CHR$(RR);:NEXTI
1470 PRINT@264,"CONGRATULATIONS''
";
1480 PLAY"O4L5T10EECCCEEDDDFFGGDDD
GGEEDDFFCCCC;O3L6T10EECCCEEDDDFFGG
DDDFFGGDDDGGEEDDFFCCCC"
1490 PRINT@296,"YOU HAVE STEAL ALL
 THE OBJECT THAT YOU NEEDED.   YOU
R SCORE IS";SC;"AND YOU HAVE";L;"L
EFT";
1500 FORI=1TO4000:NEXT
1510 GOSUB1690
1520 REM***LOSE ROUTINE***
1530 CLS1+RND(5)
1540 FOR1=1TO22
1550 PRINT@68+I,CHR$(128);
1560 PRINT@196+I,CHR$(128);:NEXT1
1570 PRINT@42,"J  A  I  L ''";
1580 FOR1=32 TO 160 STEP 32
1590 PRINT@36+1,CHR$(128);
1600 PRINT@59+I,CHR$(128);
1610 PRINT@48+I,CHR$(128);
1620 PRINT@42+I,CHR$(128);
1630 PRINT@54+I,CHR$(128);:NEXT1
1640 PRINT@263,"B A D   L U C K ''
'";
1650 PLAY"O3V31T2L4GGL8GGL4B-AABGF
+G"
1660 FOR1=1 TO 200:NEXT
1670 PRINT@322,"TOO LATE'YOU BEEN
CAUGHT AND YOU HAVE TO GO TO JAIL'
''YOUR SCORE IS";SC;"POINTS AND YO
U HAVE";L;"LIVES LEFT";
1680 FORI=1 TO 5000:NEXT
1690 PRINT@483,"PRESS SPACEBAR TO
PLAY AGAIN";
1700 KE$=INKEY$:IF KE$<>" "THEN 17
00
1800 GOTO200
```

Easy Edit

From Russell Stether in Humberside

THIS PROGRAM enables the selective listing of programs without the need to specify the start and end lines of the listing

This is done by providing the functions of listings present next previous and first lines with the press of a key

In addition the facility of editing the current line with the press key is provided

Also the standard list and edit functions are shortened to simply L and E respectively. These functions are activated as follows

@	List first line
	List next line
—	List previous line
	List current line
	Edit current line

To use these functions just press the key corresponding to the function and then press enter.

The program that does all this is a machine code routine that intercepts the ROM routine that decodes the input. If it sees something that it spots as a single key entry then it expands it to the version that Basic understands and places the in the input buffer. Control is then handed back to Basic for the interpreter to do its work. In this way the program is kept as small as possible.

The machine code is stored in the data statements of the Basic program and is *POKED to the correct place in RAM by* lines 10000 to 10090. In each data line there are eight program bytes followed by a checksum byte. The checksum is included so that any typing errors can be easily spotted.

If an error is found then the loader program prints the line number with the mistake in it and stops. Once a correct version of the code has been stored in memory then it can be saved with CSAVEM "EASYEDIT 31744 32303 559. Before the program will work it has to be activated with the command EXEC 31828.

Since this is a code program that Basic uses every time it gets an input from the keyboard, care must be taken to ensure that the Basic program does not overwrite it or POKE to an address within it. If the program is interfered with then the best that can happen is that it will stop working but more than likely a system crash will result.

In order to stop Basic overwriting, a CLEAR command should be used to limit the maximum Basic address to 31477 — for instance CLEAR 500 31477 will reserve 500 bytes for string space and limits Basic to 31477 as top of RAM.

```
1100 DATA069,065,083,089,109,069,068,073,113
1200 DATA084,096,066,089,096,082,110,083,194
1300 DATA08[illegible],065,084,072,069,082,096,096,136
1400 DATA096,096,096,096,096,096,096,096,000
1500 DATA000,204,187,173,192,197,172,174,019
1600 DATA128,000,124,245,125,159,126,008,147
1700 DATA125,254,124,251,126,020,125,248,249
1800 DATA255,000,255,000,255,076,073,083,229
1900 DATA084,000,255,000,255,000,000,008,090
2000 DATA255,000,000,000,000,000,000,084,083
2100 DATA073,068,069,000,134,126,183,001,142
2200 DATA163,204,124,129,253,001,164,134,148
2300 DATA096,142,004,000,167,128,140,005,170
2400 DATA255,035,249,204,004,064,221,136,144
2500 DATA142,004,000,198,032,016,142,124,146
2600 DATA000,166,160,167,128,090,038,249,230
2700 DATA057,016,142,124,033,095,142,002,099
2800 DATA221,166,160,160,128,039,250,129,229
2900 DATA128,039,017,049,063,166,160,132,244
3000 DATA128,129,128,038,248,203,002,166,018
3100 DATA164,039,002,032,225,057,142,124,017
3200 DATA042,173,149,032,248,134,032,151,193
3300 DATA255,126,192,005,182,002,222,129,089
3400 DATA032,039,028,129 000,039,024,129,164
3500 DATA057,034,004,129,048,034,003,053,106
3600 DATA0[illegible]6,057,142,002,222,166,178,039,250
3700 DATA006,129,061,079,242,032,246,142,129
3800 DATA002,222,166,128,038,252,166,130,080
3900 DATA167,003,140,002,222,038,247,057,108
4000 DATA134,084,167,002,134,083,167,001,004
4100 DATA134,073,167,132,057,189,124,180,032
4200 DATA022,255,237,189,124,180,134,084,201
4300 DATA167,002,134,073,167,001,134,068,234
4400 DATA167,1[illegible]2,057,142,124,056,141,084,135
4500 DATA14[illegible],1[illegible]4,065,141,079,134,001,183,101
4600 DATA124,[illegible]60,198,003,247,124,071,016,075
4700 DATA142,124,073,246,124,071,166,165,087
4800 DATA15[illegible],002,134 008,183,124,072,053,116
4900 DATA032,07[illegible],052,002,036,009,016,142,073
5000 DATA121,[illegible]65,14[illegible],124,056,141,022,016,178
5100 DATA14[illegible],1[illegible]4,056,142,1[illegible]4,056,141,017,030
5200 DATA122,124,072,078,226,12[illegible],124,071,131
5300 DATA053,002,042,203,057,198,004,028,075
5400 DATA254,166,133,169 165,025,167,165,220
5500 DATA090,042,246,057,198,005,111,128,107
5600 DATA090,038,251,057,182,124,083,039,096
5700 DATA005,127,124,083,032,057,158,102,126
5800 DATA236,002,253,124,075,141,008,141,212
5900 DATA006,252,124,077,253,124,075,158,045
6000 DATA025,236,002,016,179,124,075,038,188
6100 DATA001,057,174,132,253,124,077,236,030
6200 DATA132,038,238,252,124,075,087,141,033
6300 DATA203,174,132,236,002,057,124,075,175
6400 DATA189,125,011,182,124,067,139,048,117
6500 DATA183,124,065,182,124,068,132,015,125
6600 DATA139,048,183,124,067,182,124,068,167
6700 DATA141,049,139,048,183,124,066,182,164
6800 DATA124,069,141,039,139,048,187,124,099
6900 DATA068,182,124,069,132,015,139,048,069
7000 DATA183,124,069,142,124,061,198,010,14[illegible]
7100 DATA016,142,002,221,166,128,167,160,274
7200 DATA090,038,249,220,136,171,000,064,160
7300 DATA221,136,057,068,068,068,068,057,231
7400 DATA189,125,108,126,125,165,158,025,25[illegible]
7500 DATA236,002,253,124,075,126,125,165,082
7600 DATA189,125,108,252,124,077,253,124,228
7700 DATA075,126,125,165,189,125,108,189,078
7800 DATA125,165,134,255,183,124,083,142,187
7900 DATA124,079,016,142,002,221,198,003,017
8000 DATA166,128,167,165,090,042,249,057,040
10000 LI=1000
10005 FOR I=31744 TO 32303 STEP 8
10010 SU=0:LI=LI+100
10020 FOR J=I TO I+7
10030 READ A
10040 SU=SU+A
10050 POKE J,A
10060 NEXT J
10070 READ CH
10075 SU=SU AND 255
10080 IF SU=CH THEN NEXT ELSE PRINT LI STOP
```

Shoot

From Duncan Rowland in Lincolnshire

THIS IS a game of reflexes. The idea is to outdraw the cowboy shown on the screen before he shoots you.

Program notes

60-400	The graphics of the cowboy
420	Wait before the cowboy draws (checks for a cheat)
450	The time after the cowboy has drawn and before he shoots
820	If you shoot all the cowboys then it *plays a tune*.

```
0 CLS:INPUT" ENTER STARTING LEVEL(
1/10)";T
20 IF T<1 AND T>10 THEN RUN
30 TI=T*100
40 IF TI<0 OR TI>1000 THEN RUN
50 GOSUB 720:GOSUB 760
60 PMODE4,1:SCREEN1,1:PCLS
70 DRAW"BM105,30;D3F3R1BR10R1E3U3
```

Continued on page 35

MONEYBOX

PERSONAL ACCOUNTS PROGRAM for DRAGON 32

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Death Valley

Actual screen photograph

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```
80 CIRCLE(108,25),2
90 CIRCLE(120,25),2
100 DRAW"BM115,30;D5BL2U5"
110 CIRCLE(114,41),9,1,.30,.100,1
120 DRAW"BM98,20;R32BL8U10L1U1L4G4
E2H2L5D1L1D10"
130 CIRCLE(114,44),4,1,1,0,.5
140 DRAW"BM120,43;D5L1D4L1D2L3D1L2
U1L3U2L1U4L1U5"
150 PAINT(119,44),3,3
160 PAINT(119,41),3,3
170 PAINT(121,12),3,3
180 CIRCLE(100,50),7,1,.8,.5,1
190 CIRCLE(129,50),7,1,.8,.5,1
200 FOR A=50  TO 90 STEP 10
210 CIRCLE(115,A),2
220 NEXT
230 LINE(135,50)-(146,70),PSET
240 LINE(85,70)-(95,50),PSET
250 DRAW"BM85,70;L1D2L1R1D2R1BR60U
R1U2R1L1U2"
260 LINE(85,74)-(100,95),PSET
270 LINE(145,72)-(130,95),PSET
280 DRAW"BM95,70;U2R1U2R1U2R1D12L1
U2L1U2L1U2BR39U2L1U2L1U2L1D12R1U2R
1U2R1U2"
290 DRAW"BM102,102;U3R3L1D1L1U7R1U
1R1U1L1U1L1U1L6D1R4D11U8L3U4"
300 DRAW"BM105,94;U1R4U1R4U1R4U1R4
U1R4U1R4U1R4D4L4D1L4D1L4D1L4D1L4D1
L4D1L5"
310 PAINT(106,95)
320 LINE(100,143)-(102,102),PSET
330 LINE(132,143)-(130,95),PSET
340 DRAW"BM115,100;D1D1L2D1L1D1L1D
2BR5BU5D1R2D1R1D1R1D2D1DR1D2DL1D1D
BL9U1DL1U2DR1U12"
350 DRAW"BM121,150;H4F2E2G4E2U2D4U
2L2R4"
360 DRAW"BM115,150;H4F2E2G4E2U2D4U
2L2R4"
370 DRAW"BM112,147;D10L5U2L4D1L3D1
L3U1L2U1L1U2L1R1U1R2U1R4U1R3U1R2U2
R1U1L7U3D3R12"
380 DRAW"BM119,147;D10R5U2R4D1R3D1
R3U1R2U2R1U2R1L1U1L2U1L4U1L3U1L2U2
L1U1R7U3D3L12"
390 PAINT(110,148)
400 PAINT(121,149)
410 A=RND(1000)+100
420 FOR N=1 TO A:A$=INKEY$:IF A$<>
""THEN 690 ELSE NEXT N
430 GOSUB 550
440 TIMER=0
450 FOR N=1 TO TI:IF INKEY$<>""THE
N 580
460 IF TI=<0 THEN GOTO 800
470 NEXT N
480 FOR N=1 TO 10:PCLS1:PLAY MU$(2
):PCLS2:NEXT N
490 CLS:PRINT"                TOO SLOW"
500 PLAY MU$(1)
510 A$=INKEY$
520 PRINT@457,"PRESS ANY KEY"
530 A$=INKEY$:IF A$=""THEN 530
540 RUN
550 DRAW"BM100,80;R2D3L2U3R1U1D1R1
D3R1D4L4U4"
560 LINE(98,90)-(105,100),PRESET,B
F
570 RETURN
580 TM=TIMER:CLS:PRINT"
 BLAM                          WELL
 DONE"
590 M=M+1:PRINT"IT TOOK YOU";TM;"M
ICRO SECONDS"
600 PLAY MU$(2)
610 FOR N=1 TO 300:NEXT
620 PRINT"YOU'VE SHOT";M;"OF THEM"
630 TI=TI-50
640 PLAY MU$(3)
650 PRINT@457,"PRESS ANY KEY"
660 A$=INKEY$
670 A$=INKEY$:IF A$=""THEN 670
680 GOTO 60
690 CLS:PRINT"                  CHEAT"
700 PLAY MU$(1)
710 GOTO 510
720 MU$(1)="T2L10O3CCCD1C"
730 MU$(2)="O2T255L255BAGFEDC"
740 MU$(3)="O3T4L10EC+EC+EO1AA"
750 RETURN
760 CLS:PRINT"====================
=============-------SHOOT OUT BY OU
NK------------=========='31/3/84'====
========";
770 PRINT"INSTRUCTIONS
          -------------THE AIM OF THE
 GAME IS TO SHOOT ";INT(TI/50)+1;"
 MEN BEFORE THEY  SHOOT YOU AFTER
EACH MAN YOU    WILL BE TOLD HOW M
ANY MEN YOU   HAVE SHOT & EACH NEW
 MAN WILL   PULL HIS TRIGGER A BIT
 QUICKER  ";
780 PRINT"THAN THE MAN BEFORE HIM
         YOU PRESS ANY KEY TO SHOOT
 BUT DO NOT SHOOT BEFORE HE RAISES
   HIS GUN.
          PRESS ANY KEY."
790 IF INKEY$=""THEN 790 ELSE RETU
RN
800 FOR N=1 TO 50:IF INKEY$=""THEN
 NEXT ELSE CLS:PRINT" WELL DONE YO
U KILLED THEM ALL":GOTO 820
810 GOTO 490
820 PLAY"T5L2O2G#L5G#L2G#O3CD#L1G#
L2G#G#CDD#"
830 SCREEN1,1
840 IF INKEY$=""THEN 840
850 RUN
```

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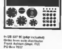

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Inside the front cover

***Mike Harrison** rounds up his reviews with a look at three books dealing with machine code*

IN PREVIOUS REVIEWS (*Dragon User* June, July) I looked at a range of books dealing with Basic programming through to controlling the whole machine by means of its own language — 6809 machine code In doing so I have discussed the advantages of machine code programming you can have complete control not only of your machine but also over all characters and hardware features

Faster execution of instructions (in some cases by a factor of 10^3) and the use of less memory are attractive features of machine code but the drawbacks are also formidable It is estimated that a programmer can write a program about 10 times as fast in a high level language compared to assembly code That's just writing the program it doesn't include problem definition and design, debugging and testing For machine code programming in assembly language you need to know the instruction set registers or other features The interpreter (or in some cases compiler) takes care of this in high level languages

Popular choices

However, almost all microcomputer programmers ultimately find that they need some knowledge of assembly language most often to debug programs, write I/0 routines or speed up/shorten critical sections of programs So where are they to, turn for help? Our list (*Dragon User* June 1984) gives some choices and here I will look at three of the most popular

Introducing Dragon Machine Code by Ian Sinclair is an excellent beginners guide to this field The author should have some skills at explaining elements of computers and electronics having written over 40 books on the subject aimed mainly at beginners The book does not fall into the trap of assuming that its readers are already familiar with machine code programming and just want to transfer this knowledge to the Dragon Nor does it treat machine coding as a study in itself without telling the reader how to apply it to the machine The author declares two aims

- To introduce the Dragon owner to some of the details of how the computer works
- To introduce the methods of machine code programming in a simple way

"ROM RAM Bytes and Bits" chapter one explains very carefully and deliberately from first principles how eight bits (on and off lines) combine to make up a byte and how Read Only Memory, which can be read and copied but not changed is

INTRODUCING
DRAGON
MACHINE CODE
&H26 &H20 &H22
&H31 &H64
IAN SINCLAIR

different from Read Write memory (known as RAM — also referred to as Random Access Memory)

Have you noticed how often we are told that certain features of the Dragon can take values from 0 to 255? Well a group of eight bits or switches can represent 2^8 = 256 different states So one byte could have any one value according to the combination of its switches ranging from $00000000_2 = 0_{10}$ to $11111111_2 = 255_{10}$, ie $2^7 + 2^6 + 2^5 + 2^4 + 2^3 + 2^2 + 2^1 + 2^0$ Each of the 32768 bytes of RAM in the Dragon 32 can store a number in this range

Now numbers themselves are not of much use but if treated as codes a variety of possibilities open up Many readers will be familiar with ASCII codes to represent alphanumerics and controls to peripherals but the Dragon also represents Basic words as tokens PRINT for example is memorised in token form as 135 and in this way is stored in one byte of memory — much more efficient than having to use bytes for the ASCII code for each letter (Incidentally this is why we can use '?' in programs because this also has a token of 135 and when the token is recalled it is recognised as PRINT and appears so in lists or edited lines)

When you use Basic the only commands that you can use are those for which tokens are provided Some knowledge of machine codes would allow you to make your own Hence if you want to do other than select from the menu of machine code subroutines provided in Basic you have to go to direct action on the microprocessor unit The author aims to have you do this

The book makes sure you understand what happens in "direct action" when you switch on your Dragon so you know what you are working on An initialisation routine (a long machine code program from ROM) checks the RAM and writes to parts of it with bytes which will be used later It also "cleans up" the areas which will be used to store instructions and data Initially when power is supplied to the machine it is full of "garbage" as bits are switched on or off at random The initialisation process fills each byte with a much more ordered pattern as you will see if you investigate thus

```
FORN = 13824 TO 13847   ?PEEK(N),
 ' NEXT
```

Memory storage

The author also sets out to teach you how a Basic program is stored in memory Just above any program resides the variable table list (VTL) This is the part of RAM used to store the current value of any variable used in programs As your program runs these variable values are constantly read and re-written from this list according to the program instructions Its position in memory is not fixed but is adjusted to fit in the free space above the program — hence if you add to or shorten your program the VTL is destroyed and has to be re-written by running the program again You can find the VTL address by

```
PEEK(27) *256 + PEEK(28)
```

and information is given such that its contents can be examined by use of VARPTR Stored programs and variables can then be examined and it is but a short step to interfering with them How about a program where every line number is 10 yet still runs sequentially (running depends on the "next line" addresses stored with the program not on how the lines are numbered)? In this way we learn about the memory organisation of the Dragon

Ian also points to why interpreted Basic is so slow For example

```
10 FOR N = 1 TO 50
20 PRINT N      30 NEXT
```

This requires the action of reading the PRINT token of 135 and finding where the correct subroutine is stored The whole process will be carried out 50 times. There is no simple way of finding it once then using it 50 times — we have to have 50 searches.

The action of the microprocessor is completely automatic and is built into the chip itself. The snag is that the machine code programs must work to the same rules and get the program right (100% correct is just good enough). If you feed a microprocessor with an instruction byte when it expects a data byte or vice versa you could well get an endless loop "hanging" the computer with a blank screen and ineffective keys and reset button. The only way is off and that means losing your work. To get you used to these structures Ian gets you writing and running machine code so you learn from your own mistakes.

Addresses

The 6809 has the capability to work with various addressing modes: immediate, extended, direct page, constant indexed, accumulator indexed, relative and indirect. Each method has considerable space devoted to it to ensure understanding and to supply the reader with a choice before his own efforts get under way.

Interacting directly with your Dragon is done by means of a simple machine code program which is coaxed out of your grey matter and placed in a "roped off" area of memory by use of CLEAR. You also have to put into the program counter the starting byte of your program. You can in fact do this by using the Basic EXEC which incidentally has another subroutine which copies the current contents of the 6809 registers into the stack so that on return they can be recalled for use in any current Basic program.

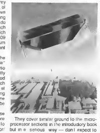
In the absence of an assembler the author shows us how to "hand assemble" some simple routines and POKE them into memory. He uses examples, each slightly more complex than the last, as a method of stretching your understanding to each new concept. Taking a bigger "byte" of coding we are shown how to link existing subroutines in ROM to our own machine code. Thus the ROM routines can be made to fulfil ends of our own choosing.

Debugging hints abound — if all else fails add $39 after each memory store command and then PEEK into memory to see if it's what you expect. The monitor/assembler is closely described and longer programs are prepared for the DEMON/DASM cartridge (DREAM wasn't out at the time of writing).

One of the main problems of an introductory book is knowing where to stop. Ian pitches his book nicely, leaving readers at a stage where they can start to knit together programs of their own but with a thirst for more knowledge. On the launch pad you are in a position to progress by examining programs printed in magazines and books and to recognise addresses you might find useful in the future. Some useful starts to machine code programs are provided for you to cannibalise. These include one to key graphics characters directly to the screen, to achieve a keybeep, flicking between text and graphics and one to move a blob around the screen. They are presented in a form suitable for DASM assembly but can be hand converted and POKEd if desired. The appendices include the 6809 instruction set and a useful dis-assembler which can be typed in.

Inside the Dragon is certainly a treasure to would-be machine code programmers, but where do they go from there? Up to recently every request of this nature I have read has been answered with the mention of two very expensive books. Both *Programming the 6809* and *6809 Assembly Language Programming* are American in origin and were published before the Dragon came out.

The first of these, by Rodney Zaks and William Labiak (distributed by Computer Bookshop) sets out to school you in the principles of chip manipulation and to do it right. Ten per cent of programmers, say the authors, can write successfully without recourse to a flow chart of their desired program. Unfortunately 90 per cent of the population believe they belong to this minority. Thus the authors push readers to do this elementary task before they start and thereby avoid "unclean" and muddled programs which take longer to put right than to write in the first place.



They cover similar ground to the microprocessor sections in the introductory book but in a serious way — don't expect to enjoy a good read if you buy this book. In the text book style there are exercises at the end of each chapter to make sure you've been paying attention. I couldn't find any answers to these questions so still don't know if my answers are correct.

The internal organisation of the 6809 is rigorously examined with its instruction formats, their execution and eventually the signals of the microprocessor chip. The registers need to be fully understood and this knowledge is relied on in subsequent chapters. Rapidly Rodney and William progress to how information is manipulated by instructions, introducing increasingly complex algorithms and translating them into programs. They examine the main types of instructions and important structures such as loops, stacks and subroutines, and go on to describe in detail the six categories of instructions available on the 6809.

It is not necessary to understand the role of each and every instruction to start programming; just a few essential instructions of each type will do. However, say the authors, you will soon want details of the full set in order to make your programs as efficient as possible. Here the authors do a magnificent job devoting 70 pages to individual descriptions of each member of the set.

The programmers' dream chip is so named because of the variety of addressing techniques to facilitate data retrieval within the memory area. To program the 6809 efficiently it is necessary to understand the many addressing mechanisms and the authors go far enough to ensure that you stand a good chance of doing so.

As in *Inside the Dragon* (see July's *Dragon User*) a considerable weight is given to input/output techniques. Input is the transfer of data from a peripheral external to the MPU (keyboard, disk and so on) to internal computer storage. Output is the transfer of data from within the microprocessor or the memory to an external device like a screen, disk or printer. Rodney and William show how several input/output devices can be managed simultaneously, and space is devoted to polling vs interrupt techniques. Benchmark programs in the case of a parallel transfer and a parallel-to-serial conversion are examined and they teach you how to schedule the operation of multiple peripherals.

General survey

The task of programming a system includes not only programming the microprocessor itself but also the input/output chips. The 6809 was designed to provide 16 bit microprocessor capability whilst interfacing easily with any of the extensive 6800 family of I/O chips developed for 8-bit processors and also most 6502 I/O devices. Here the book by necessity is very general and is not tremendously pertinent to Dragon owners' needs. It surveys the field of use of the 6809 chip rather than providing help for the programmer.

Chapters on data structure and program development conclude this professional book which I am sure, as a study, does great credit to its writers. If you intend to immerse yourself in machine code and already have substantial knowledge of the rest of the Dragon then *Programming the 6809* will be of benefit to you. If you need to know the precise nature of the MPU to squeeze out every bit of its potential then the book is £12.50 well spent. If, however, you just want a little amusement or want to sharpen up a few routines in your Basic program, if you are a novice to machine code or if you want a book to give you a library of practical routines which will make things happen — then don't bother.

The other "all or nothing" book and the last in this series of reviews is *6809 Assembly Language Programming* by Lance A Leventhal, published by Osborne/McGraw-Hill. I found this book a better ▶

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◀ proposition. It is more readable and addresses itself to problems and an explanation of their solutions rather than glorying in the mysteries of the chip itself. The format of the book is interesting. Lance uses two different type faces. On each page and within each paragraph the important concepts and main ideas are in bold print. Explanations and elaborations take up the rest of the space. I found myself scanning the black type until I hit upon an idea I wanted to follow up and then read this closely. In this way the "text book" atmosphere of the book could be overcome.

Program details

The book's stated aim is to pass on knowledge of the chip enabling you to program it in assembly language. Each assembly directive is explained and a run down given of the different types of assemblers. Some introductory programs that perform microprocessor tasks are listed. Each program contains:

- A description of the problem
- A statement of purpose that describes the specific tasks the program performs and the memory locations it uses
- A flow chart
- A sample problem with data and results
- The assembly language listing
- The hexadecimal object code
- Explanatory notes that discuss the instructions and methods used

In this way we learn 8-bit data transfer, 8-bit addition, to shift left 1 bit, to mask off the most significant 4 bits, clear a memory location, byte disassembly, and to find the larger of two numbers. Compare this to the machine code routines found in some books and you can see why this is only for the very serious.

The author gives us next a tutorial on machine code program loops and how to use them in modules to sum data, learn to use negative number elements and find the maximum value in a block of unsigned binary numbers. Microprocessors often handle data which represents printed characters rather than numeric quantities. So handling 7-bit ASCII coded data has a chapter devoted to it. This chapter, like all the rest, is very well written and is probably ideal for those heavily into assembly language and certainly those who might use their 6809 knowledge on other machines in future years. Its disadvantage is that you cannot use this knowledge and apply it to make things happen without further information.

6809
6809 ASSEMBLY LANGUAGE PROGRAMMING
BY LANCE A. LEVENTHAL
6809

Recommendations

Neither of the advanced books mentions the Dragon or the Tandy Colour Computer. So there are no games or hi-res routines. Readers also know that it makes sense to make use of some ROM routines and Basic statements to save yards of hieroglyphics — the books are of no use here either. So for those who want to go further into machine code on the Dragon, I would recommend *Inside the Dragon* as a better buy at half the price. If you still, however, feel attracted to the two further texts described above don't buy them by mail order — go to a specialist computer book shop and have a good look before immersing yourself in machine code from this angle.

If any of my descriptions have interested you in any particular book reviewed in this series of articles, I hope you'll put it on your birthday list. Some of the books cost less than a games tape and, who knows, may set you on the path to fame and fortune. My thanks go to the various publishers for providing me with copies of the books, and to Computer Bookshop Ltd, distributors of *Programming the 6809*, published by Sybex ●

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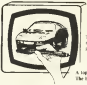

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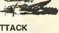

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MIKE GERRARD'S ADVENTURE TRAIL

HAVING BEEN promised an early look at the Dragon versions of the **Mysterious Adventure** series, so popular on most other home micros, a phone call from Channel 8 revealed that in producing the master tapes some data had been corrupted and final copies had been held up. However, we have been promised them within the next few weeks. Meanwhile, a look at two of this month's adventure releases, one from a new software name, Slik Software, and the other the much-awaited sequel to **Pettegrew's Diary**: **Operation Safras** from Shards Software.

Lame Duck

Any company calling themselves Slik are asking for trouble if they don't produce a professional product, and regrettably with **Sunken City** they haven't. It is rather disconcerting to read on the cassette cover that "If thick white vertical lines appear on the hi-res screen when you first run it, press BREAK and type RUN." Sure enough, each time I've loaded the game so far those lines have appeared on the high res world map which greets you as you start the game, though they do disappear second time around. The main problem with this adventure is quite simply that it is not very original, but is similar and inferior to that to **The Ring of Darkness** from Wintersoft, whose follow up **Return of the Ring** is being offered as a prize in our adventure competition (see facing page). Why similar? Well, you start out as a flashing character (so to speak) on a large scale map, around which you move using the cursor keys. Where **Ring** has bandits and thieves leaping out at you unexpectedly, **Sunken City** has mules and wolves.

When you reach certain points on the map you can ENTER the location by pressing the "E" key (one of only five commands available to you) and the display switches to that of the location, for instance Ottawaville, where you can move around again using cursor keys, to buy supplies, be given tasks by the chief, buy transport or visit the armoury. This last is rather unusual as the adventure is set in 1850 and opens in North America, where I feel armour was not the height of fashion at that time.

The purpose of the adventure is to find the Wheel of Time, buried in the Sunken City, and you're doing this on behalf of one Professor Ellis, who needs the wheel to complete his Time Machine. There are plenty of adventure elements in the game, such as the fact that you cannot travel to South America until you devise some way of getting past a persistently awkward Red Indian, and you need to do that to complete the task set for you in Ottawaville which may earn you enough money to buy a boat to set sail and reach another continent. But there are also so many boring elements that it is very hard to recommend the game. Every time the wolves, bears or whatever leap out at you they deprive you of some of your mortality points, and you always kill them "with a lucky punch" which somehow earns you a few sovereigns — I must admit that the logic of this escapes me, though the tedium didn't.

By comparison, **Operation Safras** wasn't too bad, though I'd better admit at once that I didn't really care for this, just as I didn't care for **Pettigrew's Diary**, which seems to put me in a minority as far as reviewers are concerned. However, **Son of Pettigrew** is in three parts, and casts you as cost accountant, part-time computer programmer and part-time secret agent Rupert James Pettigrew. The first chapter, "The Awakening," is not for the impatient, as you must wait a full four minutes once the game has finished loading before you do a single thing. The graphics and sound effects are admittedly good, but to have to sit through them every time you load the game until you solve this first chapter is a little too much.

At the end of the preamble you will be asked half a dozen questions to test your observation of what's gone before, and dogged determination will get you through these, though I didn't like the way you have to go back to the first question should you get a later one wrong. If you're a little uncertain on question six, why should you type in the answers to the first five questions again ... and again ... and again when you've already proved that you know the answers? The same applies to the last code number which you have to work out in order to load Chapter two. There's some guesswork involved here for most people I imagine, but get it wrong and you are sent back to answer those same six wretched questions yet again.

Chapter two is "The Searching" and is similar to the second section of **Pettigrew**, but here the adventure extends to the whole of the British Isles rather than just the streets of London, though that's where you start off your hunt for your five fellow agents, held by the enemy in secret locations throughout the country. You are given £500, a map of the UK, a list of towns you can visit, and an agent locator device. This means that the five agents are listed across the bottom of the screen with a cursor indicating which is nearest you, and a figure denoting the hours ticking away for each agent.

In some ways this is a conventional text adventure, with commands entered in the usual Noun/Verb manner, though I don't think it's conventional to be told "You can't do that, I'm afraid!" when you haven't even touched the keyboard, which happens constantly. You can travel from town to town (GO BRIGHTON) by car, rail, plane or hitch hiking, and you must decide which is best in terms of time taken (this is a real-time adventure) and cash consumed.

I wasn't too successful with the second part, and although I'd been given the code word to load Chapter three, "The Returning," I wasn't asked for it and the eight separate challenges contained in this section simply began. The first has you armed with a sword and facing an axe-wielding ogre, with room to enter your instructions beneath the simple picture.

Cryptic clues

Commands such as FIGHT NORTH, RUN, GO NORTH, WALK, SWING SWORD, ATTACK, all resulted in the boringly repetitive "Try Another Action" until eventually the right combination of two words led me on to the second challenge, after a rhyming preamble containing cryptic clues, some referring back to earlier chapters of **Operation Safras**. This time the graphics consisted of a gate with the same prompt awaiting your instructions beneath. Comparisons with the several tasks at the end of **Pettigrew** are inevitable, and I felt that like that earlier program this too was a collection of fairly mundane Basic programs lacking a cohesive theme, and which run out of steam very quickly. But I did say I was in a minority before, so if you loved **Pettigrew** you'll probably love this. Whoever listens to the opinions of reviewers anyway? **Pettigrew III** is probably already underway ■

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Dragon Answers

Cursor control

I WOULD be grateful if you could tell me how to move the cursor across the screen revealing a sentence as it goes along

I think this would be very helpful in programming

Stuart Clyde
East Kilbride
Scotland

A SIMPLE but effective way to achieve this is by the following routine

```
100 LET A$ =  The text to be
     printed
110 FOR I = 1 TO LEN(A$)
120 PRINT MID$(A$ I 1);
130 FOR D = 1 TO 250  NEXT D
140 NEXT I
150 PRINT
```

Here, A$ is set up as the text you wish to print and the value in the delay loop at line 130 controls the speed of printing

INKEY$ repeat

AFTER purchasing the sound extension module for the Dragon 32 by J C B Microsystems I felt that a sound generator would come in very handy I have written such a program which converted the qwerty keyboard into an organ

The Dragons INKEY$ function does not give auto repeat so the key had to be pressed to get a note each time instead of holding a key in for a continuous note until the key was released I tried using the peeks 337 to 345 but this turned out very tedious and the program very slow

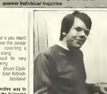
The peek addresses seem to be the only way I can get an auto repeat Can you be of any help?

Andrew Purser
Timperley
Cheshire

TO OBTAIN an autorepeat on the Dragon 32, these same locations are used, but instead of reading them, they are reset to 255 The following line will give a repeating INKEY$ function

```
100 FOR  I=337  to  345 POKE
I 255 NEXT I$ = INKEY$
```

Here, I$ will contain the character currently being held down on the keyboard The Dragon 64 has a built in autorepeat in both modes and so the for-next loop is not required on this machine



Dragon Basicode

I HAVE recently become interested in using the BBC Basicode-2 translation program with my Dragon microcomputer I am sure that it is an idea that will appeal to many other Dragon owners

The BBC does not include the Dragon on the list of computers for which a translation program has been written but the Tandy TRS 80 computer is included I would like to know whether or not the translation kit for the Tandy can be used with the Dragon?

Philip Haddock
Nantwich
Cheshire

BY THE time you read this, the official BBC version of Basicode for the Dragon should be available There is also a version available at the same price of £3 50 from Grosvenor Software (see *Dragon User* May '84)

A number of readers have asked if the BBC Basicode for the Tandy TRS-80 computer can be used with their Dragons The answer to this is *no* Don t buy the version for the Tandy as it cannot be used and cannot be converted for the Dragon This version is in fact for the TRS-80 models I and II not for the Dragon lookalike the TRS-80 Coco

Logs out of line

I AM puzzled about one of the read-outs from my Dragon 64 when using the log function PRINT LOG(1) returns 1 61385904E 10

This seems to be completely out of line with the other logs and I wonder if you can tell me if this would appear to be a fault in the computer itself?

Denis Swift
Maidenhead
Berks

YOU HAVE pointed out another bug in the Microsoft floating point arithmetic the same bug that causes so much trouble when using the ' ' operator

The way to get round this problem is instead of using X = LOG(A), use X = INT(LOG(A)*1E9)/1E9 This will give the correct answer to eight decimal places as on a calculator

Safe switch

IS IT safe to use the remote jack (from the cassette lead) as a switch for external devices?

Secondly when using CLOADM and motor on/off a clicking sound is heard from inside the Dragon Can this noise be stopped?

J Hallley
Batley
W Yorks

THE RELAY used in the Dragon is only really designed to be used with cassette recorders The relay can only handle up to about nine volts at 100 milliamps safely this means it could only be used with a light bulb or something or similar running off a battery

Of course, you could use it to control a much bigger relay which could take a full 240v mains supply Such relays cost about £1 50

The 'clicking' from the Dragon is the relay operating and cannot be stopped

Interfacing a printer

I HAVE the opportunity of buying a Silver Reed EX 44 electronic typewriter and a Silver Reed IF-44 computer interface at a very reasonable price

I have been informed that it will work on my Dragon 32 Could you please tell me if this is correct?

Also two other printers I have been looking at are the Seikosha GP 100A and the Tandy Colour Plotter 115

Are there any problems when using these two printers with the Dragon?

D C Smith
Kettering
Northants

THE Silver Reed EX-44 is a daisy wheel typewriter which can be connected to a computer via the interface box sold separately (for an extra £100)

The interface supports the parallel Centronics type — the same as used for the Dragon Providing you can obtain the necessary cable there should be no problems with this set up

The other two printers that you mention are amongst the most popular that are used with the Dragon and are easily hooked up

Warm or cold start

I HAVE come across several references to the "warm" and "cold" start particularly in connection with FORTH Could you please explain what this is about?

P Asbury Smith
London

A COLD start is what the computer does when it is first switched on, that is resetting all its internal 'note pads' and displaying the copyright message A warm start is what happens when you press the reset key — the computer is interrupted and then restarts but does not reset most of its pointers so your Basic program is not lost You can force a cold start by typing POKE 113,0 and then pressing reset

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Competition Corner

Answers to Competition Corner, *Dragon User*, 12/13 Little Newport Street, London WC2R 3LD

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*Answer **Gordon Lee's** puzzle to win a selection of Software from Microdeal*

REGULAR readers of this page may remember that in the January issue of *Dragon User* I made some general remarks about puzzle-solving. One of the points that I mentioned was to ensure that the computer is doing just what you want it to, and it is this that I would like to take a closer look at this month.

Take the following simple problem: which numbers under 400 have a square root that is a whole number? You might write something like this:

```
10 FOR N = 1 TO 400
20 S = SQR (N)
30 IF S = INT(S) THEN
   PRINT N
40 NEXT N
```

I know that this is a rather roundabout way of tackling such a problem, but it will illustrate the point in question. If the above program is run the print-out will indicate answers of only 1, 2, 3, 4, 8, 9, 11 and 16. So what about the rest? Take the first missing integer, 5. At some point while the program was running it must have checked the value 25 to determine if its square root (5) was integral and it seems come up with the wrong answer.

If we type in PRINT SQR(25) we get the expected answer 5 — so this gives us no indication as to what has gone wrong — even though this value was apparently rejected by the IF/THEN statement in the program. Now try PRINT SQR(25)-5 and surprisingly up pops the answer 1.86264515E-09. This minute decimal caused as a result of minor errors in the calculation is not big enough to show on

MICRODEAL
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the display and yet it is still there to influence any IF/THEN decisions made on it. (For a more detailed discussion of this particular difficulty see *Dragon User* October 1983 pages 31-34.)

A useful tip to eliminate the problem is to put the value to be tested into a string and then take it out again. If that sounds a touch odd, just add this line to the original program and run it again:

```
25 S = VAL(STR$(S))
```

This cures the problem — the offending digits having been well and truly chopped off! And now for something completely different.

Here is a little problem. In the following listing can you say which you would expect to be printed at line 40 — that is what is the third character of strings A$ and B$. Try to answer this one *before* running the program.

```
10 A = 12345
20 A$ = STR$(A)
30 B$ = "12345"
40 PRINT MID$(A$,3,1)
   MID$(B$,3,1)
```

If you now type in and run this program you may be surprised to find that although MID$(B$,3,1) gives a value of "3" — as might be expected — MID$(A$,3,1) returns a value of "2". So why the difference? Add the line 50 PRINT LEN(A$), LEN(B$) and you will find that A$ has grown to a length of six characters while B$ remains at five, so what has happened?

Clearly, if we are dealing with a problem in which it is important to locate the exact position of a character within a string, we could have difficulty. To take the case of B$ first: Line 30 of the program simply puts into B$ the characters contained in the quotes. The fact that they are numbers is irrelevant to the computer — they could be numbers, letters or symbols — or even a mixture of all three. The computer just regards them as five characters, so MID$(B$,3,1) will return the third character — that is "3". Now, the case of A$ is slightly different. This is a string created by the computer to hold value A, which we have defined in line 10 as being 12345. However, as this is a numerical value, the computer needs to know if this number is positive or negative and so the first character in the string is reserved for this purpose. Of course if it is positive the plus sign isn't displayed — indeed it would be rather tedious if it was, but nevertheless the space that it would occupy is still held available. There would be nothing strange about storing the value −12345 in a string and in this case the third character of the string *would* be the "2".

It's all a matter of you pays your money and you takes your choice — in either case, so long as you are aware of exactly what is happening when you write a program involving the location of digits within strings there shouldn't be any problem. But remember this only applies to strings that the computer has created to hold what was formerly a *numeric* variable. Much of the foregoing will probably be relevant to tackling this month's competition question.

I have in front of me a card on which I have written a certain number. If I were to multiply this number by itself I would get a ten-digit number in which each digit — zero to nine — occurs once and once only. If I were now to tell you how many digits in my original number are *odd* you would be able to tell me what this number is. **What number have I written on the card?**

Prize

MICRODEAL, the biggest Dragon software house in the country and regular member of the Software Top 10 charts is offering readers a chance to win £250 worth of its games and adventures.

Rules

TO WIN this month's prize you must show both the answer to the competition and how to solve it with the use of a Basic program developed on your Dragon. Please do not send in a cassette containing the answer. As a tie-breaker complete the following sentence in 15 words or less: 'I want Microdeal's range of software for my Dragon because...'

Your entry must arrive at *Dragon User* by the last working day of September. The winner and the solution to the puzzle will be published in our December issue. Entries will not be acknowledged and we cannot enter into correspondence on the result. You may only enter the competition once.

June winner

THE WINNER of June's competition and receiver of a Canon disk drive from Alpha Disc is Dianne McCrea of Belfast, Northern Ireland who correctly stated that the darts landed in treble 19, double 7 and double 16.

Horace hunt winners

THE response to our Horace Hunt competition was overwhelming and from amongst a plethora of replies we have chosen the following winners who will all receive a copy of the Dragon version of Hungry Horace:

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